

HITCHCOCK'S *Machine Tool* BLUE BOOK

FOUNDED

JANUARY 1939

1905

THE FACTORY BEHIND



WILLEY'S
CARBIDE TOOL CO.

THE
PRODUCT

ANNOUNCEMENT

"WILLEY'S" metal, beginning January 1, 1939, will be reduced from 45¢ a gram to 35¢ a gram base. We are able to make this reduction, due to our manufacturing Tungsten Carbide Metal from the powdered materials to the finished product under our own Patents Nos. 2,133,495, 2,074,038, 1,702,765, and 1,702,766 (other Patents pending).

"WILLEY'S" Tungsten Carbide Tools and Tips cover a broad range of applications. Literature further describing our products will be sent upon request.

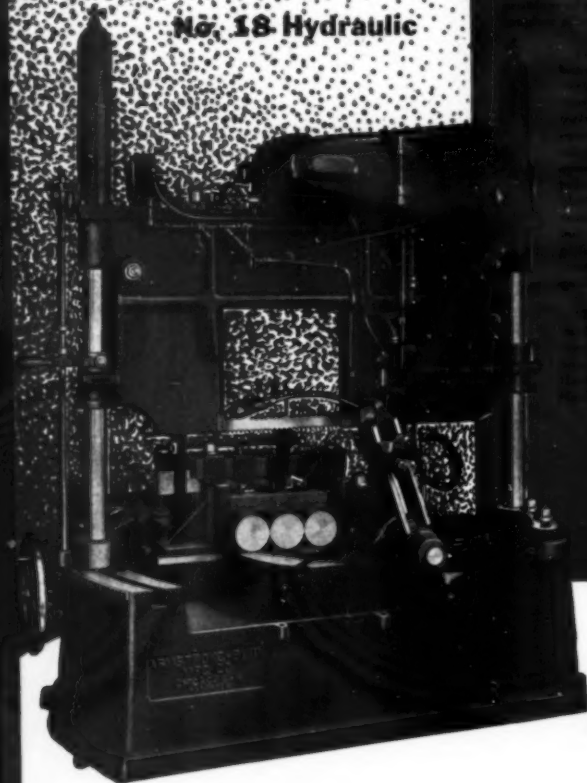
WILLEY'S CARBIDE TOOL CO.,

**1344 W. Vernor Highway,
DETROIT, MICH.**

MARVEL

SAVES

No. 18 Hydraulic



Already Acknowledged as The Law of Temperature

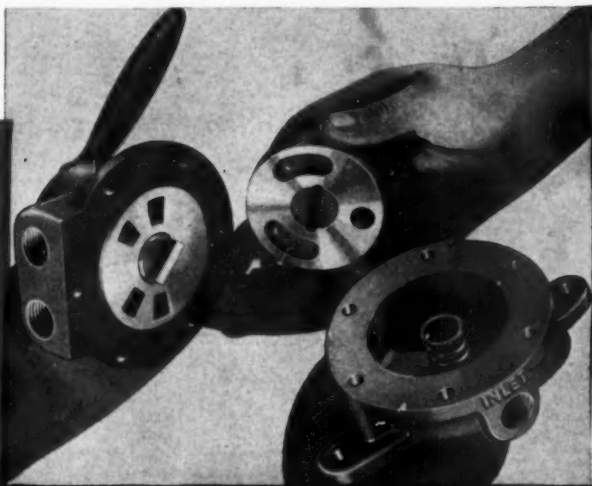
Marvel's No. 18 Hydraulic Machine is the only machine in the world that can be used for the purpose of testing the strength of materials under the influence of temperature.

Marvel's No. 18 Hydraulic Machine is the only machine in the world that can be used for the purpose of testing the strength of materials under the influence of temperature. It is the only machine in the world that can be used for the purpose of testing the strength of materials under the influence of temperature. It is the only machine in the world that can be used for the purpose of testing the strength of materials under the influence of temperature.

The Marvel's No. 18 Hydraulic Machine is the only machine in the world that can be used for the purpose of testing the strength of materials under the influence of temperature. It is the only machine in the world that can be used for the purpose of testing the strength of materials under the influence of temperature.

Marvel's No. 18 Hydraulic Machine is the only machine in the world that can be used for the purpose of testing the strength of materials under the influence of temperature.





WRITE
for Valve
Bulletin
and with
complete
illustra-
tion of all
models.

THIS SIMPLE

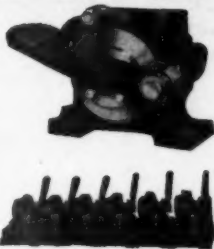
Pack-less
DESIGN



STOPS AIR VALVE TROUBLES

Hannifin disc type air control valves have no packing, and no leakage or packing maintenance troubles. The bronze disc is ground and lapped to make a perfect seal with the seat, which is similarly finished. Wear is negligible. Positive control and smooth, easy handling of air operated equipment is assured, with most economical use of air power.

Hannifin "Packless" Air Control Valves are made in 3-way and 4-way types, hand and foot operated, spring return, heavy duty rotary, manifold, and electric remote control models for control of single, or double-acting cylinders. Write for descriptive bulletin or consult Hannifin engineers for specific recommendations on control equipment to meet your needs.



HANNIFIN MANUFACTURING COMPANY

621-631 South Kolmar Avenue, Chicago, Illinois

ENGINEERS • DESIGNERS • MANUFACTURERS • Pneumatic and Hydraulic Production Tool Equipment

HANNIFIN "Packless" VALVES
AIR CONTROL

MEET MODERN COMPETITION

Spring tempered COLLETS

Order From Stock

Scientifically heat treated to a true spring temper, "Rivett Mark" collets resist wear and hold their spring longer than collets of any other make. As standard equipment on all makes of lathes and millers, (see Rivett Bulletin 100B) they may be ordered for immediate delivery from the following stocks:—

CHICAGO

R. E. Ellis Engineering Co.
365 W. Washington Blvd.

DETROIT

Charles A. Strelinger Co.
149 E. Larned Street

BOSTON

Rivett Lathe & Grinder Inc.
10 Riverview Road, Brighton

RIVETT

LATHE & GRINDER INC.
BRIGHTON, BOSTON, MASS.

MEET MODERN COMPETITION

With Chicago Steel Brake
Production Performance



**BOX
AND PAN
BRAKE—**

Forms boxes or pans from one piece of metal. A straight brake as well as a box brake. Ideal for experimental shops.



HAND BRAKE—

Improved to meet modern needs. Efficient and dependable — sturdy and durable.

building **STEEL CONSTRUCTED** sheet metal working machines are behind each **CHICAGO BRAKE**. They're built to give years of service.

ALL CHICAGO BRAKES are built of rolled steel welded sections which insure great strength, accuracy and long life. They are the most modern tools in design and workmanship to fit today's need for fast production sheet metal working machinery.

We Are The World's Largest Manufacturers Of Hand Bending, Power Bending And Power Press Brakes.

Aside from the **CHICAGO** line, we have built many special machines for intricate bending operations. Take advantage of our many years' experience by sending us any difficult bending problem you have.

DREIS & KRUMP MFG. CO.

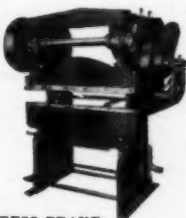
7440 LOOMIS BLVD.,

CHICAGO, ILL.



POWER BENDING BRAKE—

Indispensable wherever a volume of heavy plate work is done—forms a great variety of bends and shapes without dies.



SMALL PRESS BRAKE—

Compact, powerful money-saving production unit. Replaces cumbersome costly machines that are expensive to operate. Uses same dies as larger machines.



LARGE PRESS BRAKE—

The only press brake which turns out perfect work without shims and crowned dies. Patented non-deflecting bed equalizes pressure over the full bending length and overcomes major fault in solid bed press brakes.



**FORMING
PRESS DIES**

We manufacture any type of die required for bending process. Our die department will make to any type to meet your needs. Submit blue print or sample of work.

OVER 40,000

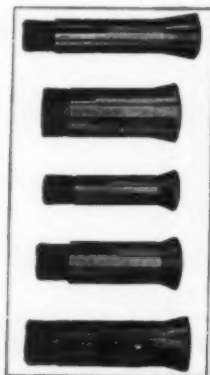
"CHICAGO" BRAKES in use by leading concerns — the world over


COLLETS

—IMMEDIATE SHIPMENT FROM STOCK—


Bulletin No. 37 available upon request

ALL SIZES





HARDINGE
DRAW-IN COLLETS
FOR ALL
LATHES AND MILLERS



DELIVERED FROM STOCK

FOR
—ACCURACY—
—STABILITY—
—ATTRACTIVE PRICES—
"SPECIFY HARDINGE COLLETS"

Refer To Guide Pages For Your Specifications
Producing and Engineering Departments. Keep This List For Reference Purposes.

Hardinge Collets are in stock for immediate delivery. Hardinge Collets embody these elements of precision which have characterized our products since 1912.

HARDINGE BROTHERS, INC., ELMIRA, NEW YORK

ALL TYPES



THE ABOVE COLLET DATA BULLETIN IS AVAILABLE FOR PRODUCTION, PURCHASING, STOCKROOM AND ENGINEERING DEPARTMENTS

Reasons Why Each Department Should Have a Copy:

1. Clearly shows the styles of collets adapted in your lathes and millers.
2. Lists the standard collets with general dimensions for identification.
3. Gives normal round, hexagon and square capacity of standard collets.
4. Shows how all of your lathes and millers may be adapted for collets.
5. Collet stocks in Elmira, Chicago, Detroit, Cleveland, New York, Hartford and Los Angeles.
6. Attractive prices are listed for round, hexagon and square hole sizes.

HARDINGE BROTHERS, Inc., Elmira, N. Y.

SPECIFY HARDINGE COLLETS

COLLETS-FEED FINGERS-PADS

FOR YOUR
AUTOMATIC and HAND SCREW MACHINES



Write for copy of catalog 34
if you have
AUTOMATIC and HAND SCREW MACHINES

MORRISON COLLETS, FEED FINGERS, MASTER COLLETS, MASTER FEED FINGERS AND PADS: for Brown & Sharpe, Cleveland, Cone, Gridley, National Acme, New Britain, Davenport, etc., Automatics.

MORRISON COLLETS: for Bardons & Oliver, Cincinnati, Foster, Garvin, Pratt & Whitney, Warner & Swasey, etc., Hand Screw Machines.

Catalog No. 34 gives complete ordering information and lists attractive prices. Illustrates and describes Style "B" Morrison Master Feed Fingers and Pads which eliminate scoring of stock.

—STANDARD SIZES FROM STOCK—

MORRISON MACHINE PRODUCTS, Inc.,

Elmira, N. Y.

Why Put Up Longer *with* Worn-out Drills

—when you can do so much better
work easier and faster with the

“Buffalo”

No. 15 Heavy Duty Production DRILLS

In fact, the extra profit you can earn
with these better drills soon pays their
entire cost many times over.

Drills are available in bench and floor
types. Heavy and rugged, they *stand-*
up on your production drilling jobs.

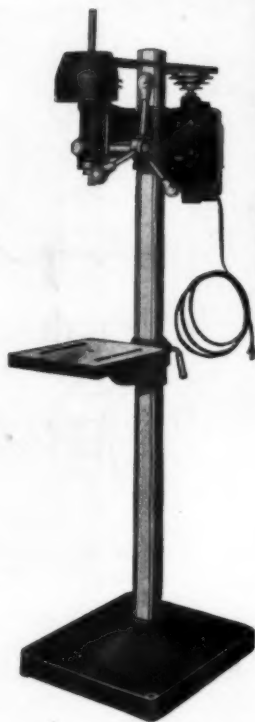
Write for literature and low prices.

BUFFALO FORGE CO.

161 Mortimer St.,

Buffalo, N. Y.

In Canada: Canadian Blower & Forge Co., Ltd., Kitchener. Ont.



**MORE
HOLES
PER
HOUR!**

**...THERE'S MORE DRILLING POWER
in SKILSAW DRILLS!**

PICK the toughest drilling job you know—put a **SKILSAW DRILL** to work—and watch it outstrip all others in smoothness, ease of handling, drilling power and all-around performance!

There's a reason—**SKILSAW DRILLS** are *different!* They are lighter . . . better built . . . they do more work, save more in operation, cost less to maintain, *yet they cost no more!* Test them on your work side-by-side with any other make and you'll insist on **SKILSAW DRILLS** the next time you buy. Made in 21 powerful models.

SKILSAW, INC., 5035 Elston Avenue, CHICAGO

214 E. 40th St., New York—52 Brookline Ave., Boston—1429 Spring Garden, Philadelphia
2124 Main Street, Dallas—1253 So. Flower Street, Los Angeles—2065 Webster Street, Oakland

SKILSAW

PORTABLE ELECTRIC TOOLS

• Sold by leading distributors of mine, mill hardware and contractors' supplies.

**SAVE MONEY IN
EVERY INDUSTRY!**

• SAWS • DRILLS • BELT SANDERS • DISC SANDERS • GRINDERS • BLOWERS •

Presenting the DALRAE MIDGETMILL

with the new

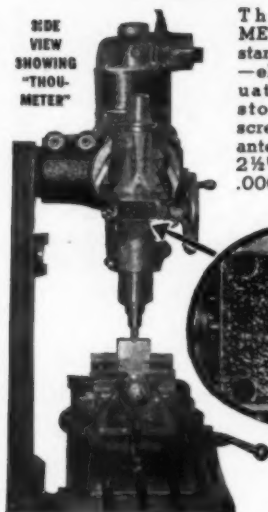
"THOU-METER"(Patent Applied For)

for setting cutting tools by
DIRECT READING ... using a
standard counter operated
from the worm shaft.

FRONT VIEW
OF
MIDGETMILL



SIDE
VIEW
SHOWING
"THOU-
METER"



The "THOU-METER" gives instant zero setting—eliminates graduations, dials, stops, binding screws, etc. Guaranteed accuracy in $2\frac{1}{2}$ " travel $\pm .00025$ ".



CLOSE-UP
VIEW OF
"THOU-METER"

DALRAE also builds the "SPEEDMILL" with 6 SPEEDS from 275 to 3200 R.P.M.

Write for new 16-Page catalog.

The DALRAE "MIDGETMILL" is a Quill Feed, High Speed Milling Machine Attachment which Mills, Drills and bores. It is completely UNIVERSAL

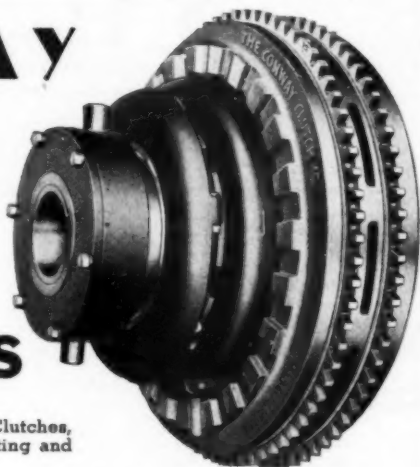
—designed for PRECISION—built for LIFE LONG ACCURACY—FAST, SAFE and EASY to SET UP—ADAPTABLE to any milling machine. A NECESSITY for the proper use of end mills.

DALRAE TOOLS CO.

501 E. WATER STREET
SYRACUSE, NEW YORK

CONWAY

LARGE SIZE DISC CLUTCHES



You'll find in CONWAY Clutches, a ready solution of all your starting and stopping problems, with . . .

Engagement

Drag-free idling

Positive, instant release

Smooth performance

Capacity for peak loads

Also, flexibility for inching or teasing without undue cost for heat or wear.

There's a size and type of CONWAY Clutch for practically every need—simple in design and construction—dependable in operation and durable in service.

Specify "CONWAY" if you're looking for the last word in friction clutches—fewer parts—perfect balance—smooth centripetal action—factors that make for Clutch satisfaction.

Remember, CONWAY Clutches are the product of one of the oldest exclusive manufacturers of friction clutches. You get the full benefit of CONWAY'S extensive and intensive clutch experience.

Send for your copy of Bulletin L-28, on heavy duty models.

Also Catalog P-24. Tell us your needs—let us submit our clutch recommendations—without obligation.

Conway Clutches are Patented in U. S. and Canada.

The Conway Clutch Co.

1541 Queen City Ave.,

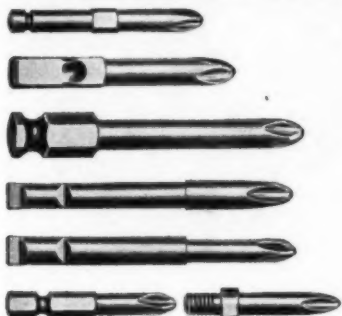
Cincinnati, Ohio

APEX

POWER BITS
for
Phillips and Slotted Screws



HAND DRIVERS
General Purpose and Super
Service for Phillips Screws



POWER BITS

Apex-Phillips Power Bits cover the entire range of Phillips screws and in design to fit all makes of Electric, Air and Spiral drivers. Made from special shock resisting steel, heat treated and tempered to give the maximum in hardness, toughness and wear resistance.

Apex Power Bits for Slotted Screws are made to fit all makes of Electric, Air and Spiral drivers and range in size from No. 4 to No. 16 screws.

HAND DRIVERS

Apex-Phillips Hand Drivers are General Purpose and Super Service types. The Super drivers are especially recommended for case-hardened and self-tapping screws. "Stubby" hand drivers are also made in both types. Immediate deliveries on all standard Phillips and Slotted Screw Power Bits.

Write for No. 10 circulars.

Phillips License No. 2
Patent Nos. 2046837-3046838-2046840

The **APEX MACHINE & TOOL** Co



RENEWING DAMAGED CABLES

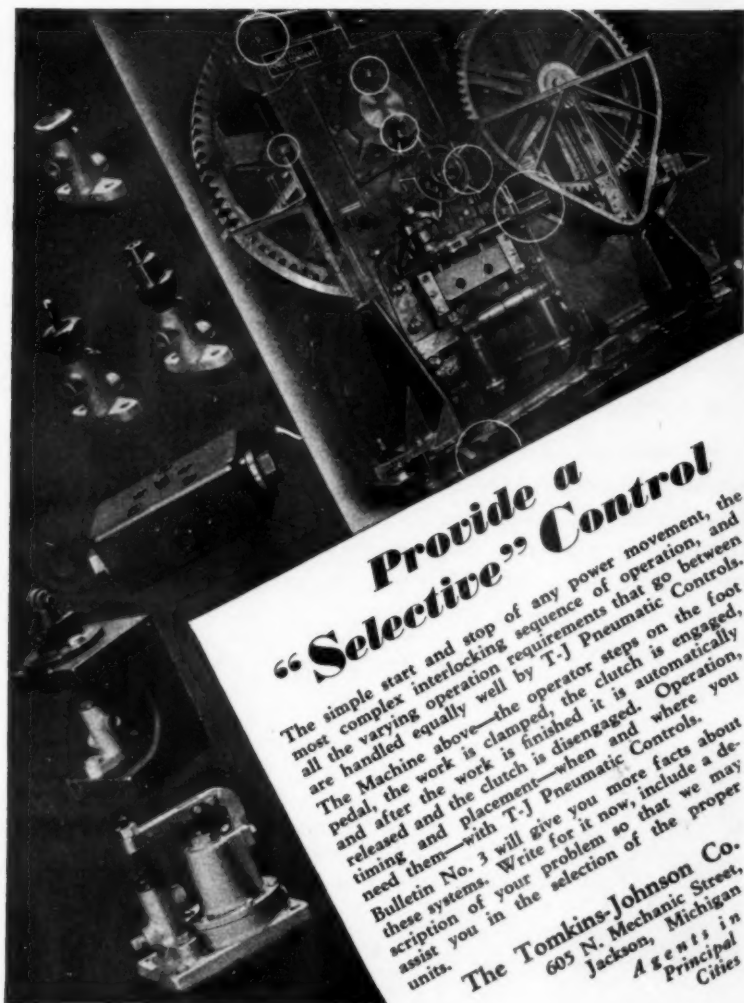
in your Flexible
Shaft Equipment

Even with the best care, flexible shafts eventually will wear out and break. The machine is then useless until a new cable can be installed — often at a time when it will cause bad tieups in production.

We have a non-ravelling cable, developed for just such situations. Every shop should carry a supply of this cable in mill lengths. It is simple, quick, and easy to renew your damaged cables the Kellerflex way. Repairs can be made immediately by your own men.

Write to the Kellerflex Sales Department for literature and prices on mill length repair cables.

PRATT & WHITNEY
Div. N-B-P Co. Hartford, Conn.



Provide a "Selective" Control

The simple start and stop of any power movement, the most complex interlocking sequence of operation, and all the varying operation requirements that go between are handled equally well by T-J Pneumatic Controls. The Machine above—the operator steps on the foot pedal, the work is clamped, the clutch is engaged, and after the work is finished it is automatically released and the clutch is disengaged. Operation, timing them—with T-J Pneumatic Controls. Bulletin No. 3 will give you more facts about these systems. Write for it now, include a description of your problem so that we may assist you in the selection of the proper units.

The Tomkins-Johnson Co.
605 N. Mechanic Street,
Jackson, Michigan
Agents in
Principal Cities

REMOTE **T-J** CONTROLS

PNEUMATIC

ARE YOU BREAKING TAPS?

THEN TRY A PROCUNIER TAPPER ON THE JOB

There is just no sense in breaking so many taps when PROCUNIER offers you double insurance against that pesty expense.

In most cases PROCUNIER high speed precision tappers will save enough in tap breakage to pay for themselves in three months. At the same time they will give you finer results and increased production.

Let PROCUNIER show you some real tapping.



Send for this folder and try a
PROCUNIER high speed tapping
head with the new TRU-GRIP
Tap Holder.

PROCUNIER SAFETY CHUCK CO.
14 S. CLINTON ST., CHICAGO, ILL.

Profits Are Bigger When *Mall* Flexible Shaft Grinders Are Used!



Sanding piston rods in a railroad shop. The same flexible shaft can be used for grinding, polishing, buffing and wire brushing.

They help turn out more work in less time without fatiguing the operator. Use these efficient grinders for grinding, sanding, polishing, and buffing. One MALL power unit will do all of these jobs. High speed or low speed attachments for each application are quickly interchanged.

Our engineers are at your service to assist you in selecting the type of unit best suited to your work. No cost or obligation!

Mall Tool Company

7742 SOUTH CHICAGO AVENUE

CHICAGO, ILL.

Complete

STEEL Storage Equipment

**for Office, Factory,
Stock and Tool Rooms**



\$44.⁹²

F. O. B. CLEVELAND, O.
SHIPPED K. O.

Style No. 412 as illustrated
consists of 4 units 36" wide
x 13" deep x 7' 3" high.

Let us tell you more about our complete and comprehensive line of INTERIOR fixtures and furnishings for offices, factories, shops, stock and tool rooms.

It includes desks of all types and sizes . . . files for correspondence, records, drawings, blueprints, etc. . . lockers, bins, cabinets, inserts, shelving, boxes, drawers, cupboards . . . sturdy modern equipment designed for attractiveness and utility . . . low in first cost and slow to depreciate.

Just tell us what you need—let us submit recommendations and prices—no obligation.

Write for full information.



The Interior Steel Equipment Co.

2352 East 69th Street,

Cleveland, Ohio

SHELVING

LOCKERS

CABINETS

FILES

DESKS

WHITNEY TOOLS

MADE BY SPECIALISTS TO MEET EVERY
NEED OF PRACTICAL SHEET METAL MEN



No. 10 Ball Bearing Punch

Capacity $\frac{3}{8}$ inch through $\frac{1}{4}$ inch iron. Depth of throat $1\frac{1}{4}$ inch. Height of throat $\frac{3}{8}$ inch. Furnished with one punch in any size from $\frac{1}{8}$ to $\frac{1}{2}$ by $\frac{1}{8}$.



No. 4 Angle Iron Shear

Capacity 2"x2"x $\frac{1}{4}$ " angle iron or smaller.



Angle Mitre Notcher and Angle Iron Bender

Capacity 2"x2"x $\frac{1}{4}$ " angle iron or smaller. A pair of tools that every shop ought to have. They are Nos. 50 and 51 in our catalog.

Whitney manufactures more than 80 types of Shears, Punches and other tool equipment for metal working — dependable items perfected through long experience and close contact with the trade — tools that have "always made good."

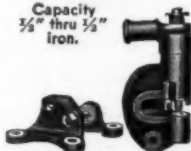


Imperial Roller Bearing Punches

—offered in 3 sizes—will work inside 90 degrees. Quick changing for punches and dies —no cams to wear—stripping action is positive.

No. 20 Ball Bearing Punch

Capacity $\frac{3}{8}$ " thru $\frac{1}{2}$ " iron.

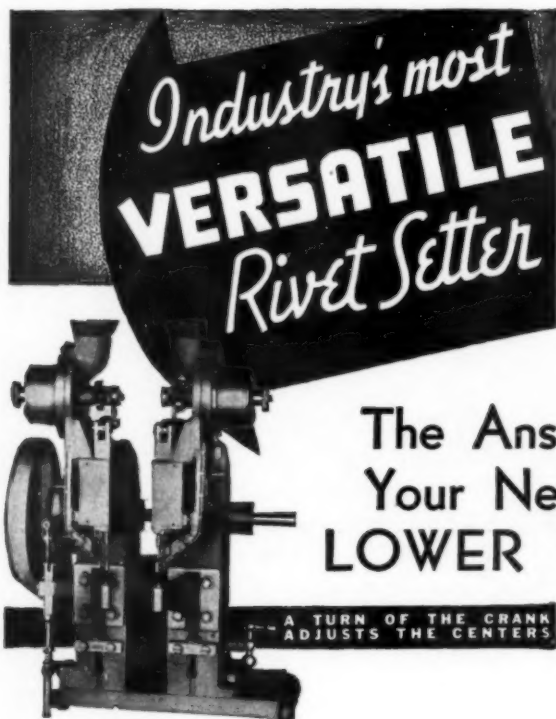


Aircraft Rivet Squeezer

Capacity $\frac{3}{8}$ inch aluminum rivet. Spindle travel $\frac{1}{2}$ inch. Made in 5 sizes, with throat depths from $\frac{1}{4}$ to 6 inches.

Send for the complete Whitney catalog.

WHITNEY METAL TOOL CO.
ROCKFORD, ILLINOIS



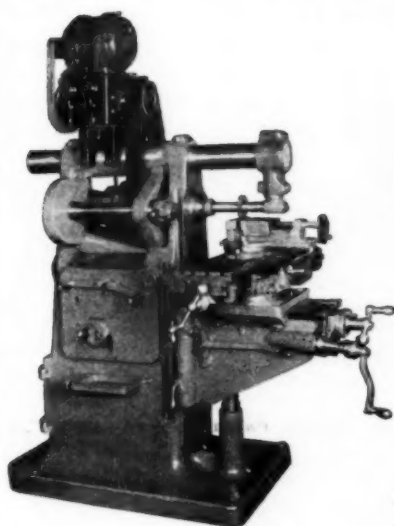
The Answer To
Your Need For
LOWER COSTS

● It will sort, feed, insert and clinch 1 or 2 rivets at a time, as you choose—*automatically*. Adjustable riveting centers permit wide assembly application, giving advantage of volume production even on small volume work.

Send blueprint or sample assembly with inquiry.

***Chicago* RIVET & MACHINE CO.**
1855 So. 54th Avenue CHICAGO, ILLINOIS
Tubular and Split Rivets in All River Metals

Now a **NEW** Turner **UNI-DRIVE**



for **MILLING MACHINES** *without* **OVERHANG or SIDE PROJECTION**

The Most compact, quiet and efficient individual drive built.

SIZES

$\frac{1}{2}$ H. P. to 10 H. P.

Can be used with any modern motor.

Fully Guaranteed.

Four Speed Silent Sliding Gear Transmission built especially for machine tool application.

Ball Bearing. All steel heat treated gear running in oil.

Can be installed (without drilling) in one hour.

Write or wire for full information or name of dealer in your territory.

ALSO built for Lathes, Shapers, Radial Drills, Turret Lathes, Vertical Mills, etc.

Mfg. by **The Turner Uni-Drive Co.** 1638 Central St.
Kansas City, Mo.

KRW Hydraulic and Sensitive ARBOR PRESSES

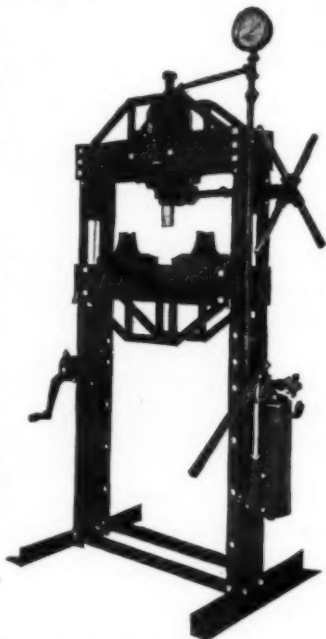
New Improvements, Special Built-in Features and Lower Prices make them an outstanding value.

THE last word in convenience, efficiency and ease of operation. Built extra strong and well braced, with steel trusses electrically welded, these presses will withstand strains that would cause presses of lighter and inferior construction to buckle or collapse.

Hand wheel for sensitive press operations has sliding handles which pull out to the ends for increased leverage. Work does not have to be changed from the work table as is the case with other make presses having a separate sensitive press unit mounted on the side or elsewhere.

The importance of this KRW feature as a time and labor saver can be appreciated. Also there is **NO EXTRA CHARGE** for this important built-in feature on a KRW Press. Work table can be raised easily with one hand. A strictly one-man Press.

Write for literature giving full details and specifications of all KRW Arbor Presses.



PRICES F. O. B. FACTORY, ARCADE, N. Y.

No. 37—35 ton Hydraulic and Sensitive Arbor Press.....	\$150.00
No. 37E—50 ton Hydraulic and Sensitive Arbor Press.....	180.00
No. 37F—70 ton Hydraulic and Sensitive Arbor Press.....	300.00
Gauge and fittings, \$15.00 extra on all presses.	

K. R. WILSON

10-16 Lock Street, Buffalo, N. Y., U.S.A.

Export Department
90 West St., New York, N. Y.

West Coast Branch
722 Mateo St., Los Angeles

Ettco - Emrick

THE FASTEST MANUAL SMALL TAPPING KNOWN

HERE'S a cut of our No. 71 gravity feed foot operated machine with our standardized multiple head.

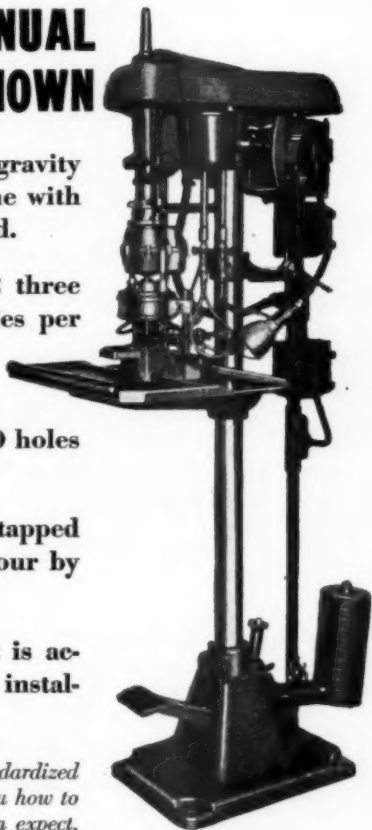
It produces 2600 No. 6—32 three hole parts or 7800 tapped holes per hour to a class 2 fit.

Another produces 1400 No. 4—36 eight hole parts or 11000 holes per hour.

Even parts with one hole are tapped at an average of 2600 per hour by our double feeding method.

As a single spindle machine it is accurate and fast. Hundreds of installations have proved that.

Let us have sample or drawing for standardized quotation. We lay out the job—tell you how to handle it and what production you can expect.



ETTCO TOOL CO.

594 JOHNSON AVE.

BROOKLYN, N. Y.

Check These Savings . . .

- ✓ **One Tool Replaces
14 Other Tools.**
- ✓ **One Tool Does
3 Jobs At Once.**
- ✓ **One Tool Does
Right Or Left
Hand Turning.**



R & L Tools save money for you in initial cost . . . and then the real savings begin in time and labor. R & L Turning Tools on your lathes or screw machines will solve your multiple production worries . . . enabling you to do pointing, centering, drilling and all kinds of turning, right or left hand, replacing 14 separate tools formerly needed for these jobs. In addition, the Tantalum Carbide backrest burnishes the work as it is being turned.

R
RIGHT

AND

L
LEFT

R & L is designed to do two or three operations simultaneously, and in ten seconds it can be converted from right to left hand turning. Concentricity of all parts turned on R & L is assured by its rigidity and precision construction.

For a full checkup on the R & L Savings . . . in first cost . . . on the job . . . and in upkeep, investigate the five sizes of R & L tools and the many jobs on which they can save you money

**R and L Tools, 1825 Bristol St.,
Nicetown, Philadelphia, Pa.**

Speed Control At Your Finger-Tips

**SCHULTES
4-SPEED DRIVES**
for
**SHAPERS,
LATHES,
MILLING MACHINES,
DRILL PRESSES,
PLANERS, ETC.**



Schultes Four Speed Safety Drives give you the same responsive, modern finger-tip speed control that you enjoy in your car. A single shift lever instantly provides any of the four speeds desired . . . and with a two-speed motor, eight speeds are available.

Schultes Drives are safe. There are no belts to change by hand. All moving parts are enclosed. A convenient hand wheel permits rotation of machine spindles for set-up work.

Ball and roller bearings are used throughout Schultes Drives. Hardened and ground gears and shafts operate in an oil bath within a sealed housing. Every feature is up-to-the minute . . . designed for efficiency and continuity of operation.

If you're interested in increasing production . . . reducing manufacturing costs and improving your products . . . rendering your machine tools more flexible in operation and location, you'll make no mistake in investigating the advantages of Schultes Drives.

**BLACKSTONE
TOOL & MFG. CO.**

11113 Outer Drive, West,
Detroit, Michigan

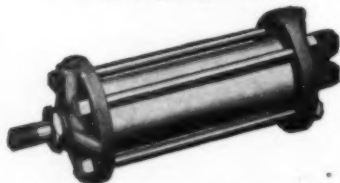


AIR CUSHIONS

in All NOPAK Air Cylinders Eliminate Costly Metal-to-Metal Impact



NOPAK Cylinder Head with built-in, non-adjustable air cushion. Adjustable head can be furnished on one end only, if desired.



NOPAK Cushioned Air Cylinder with Pendulum Mounting. All standard mountings available.

... what's more, the new type, NOPAK Air Cylinders, with Non-adjustable, pneumatic cushion-stop, sell in the *same price range as non-cushioned cylinders!*

Now, instead of choosing between cushioned and non-cushioned cylinders, you choose between adjustable and non-adjustable cushion heads. Whichever you specify, you are sure of relief from noisy, wearing, piston-hammering, longer life for pistons, and cup-leathers, lower maintenance costs, and smoother, more efficient performance.

Both types of NOPAK Cushioned Air Cylinders have Special Composition Cup Packing and extra-wide piston bearing to protect cups from excessive wear and friction. Write for New Illustrated Bulletin.

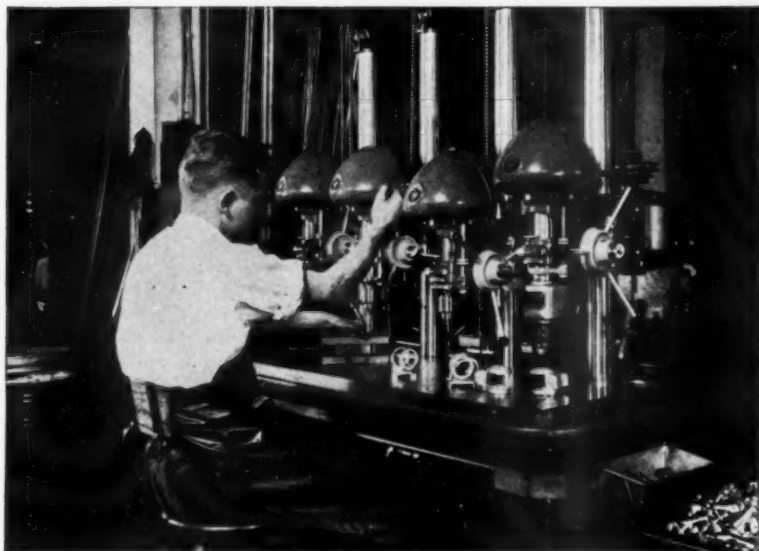
GALLAND-HENNING MFG. CO.

2754 S. 31st STREET
MILWAUKEE • WIS.

NOPAK

VALVES
and CYLINDERS

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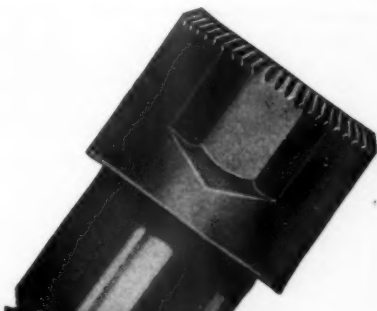


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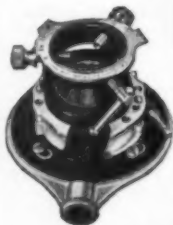
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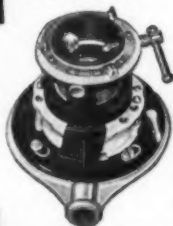
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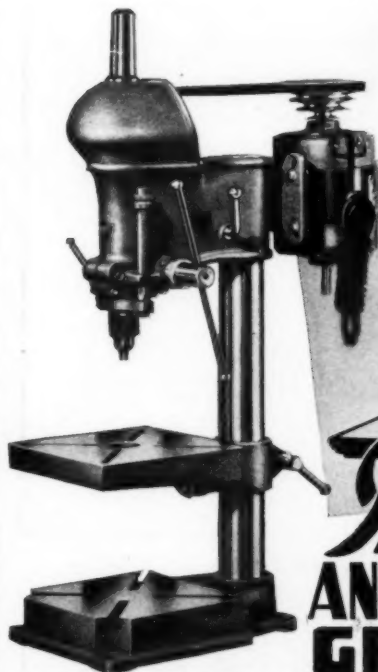
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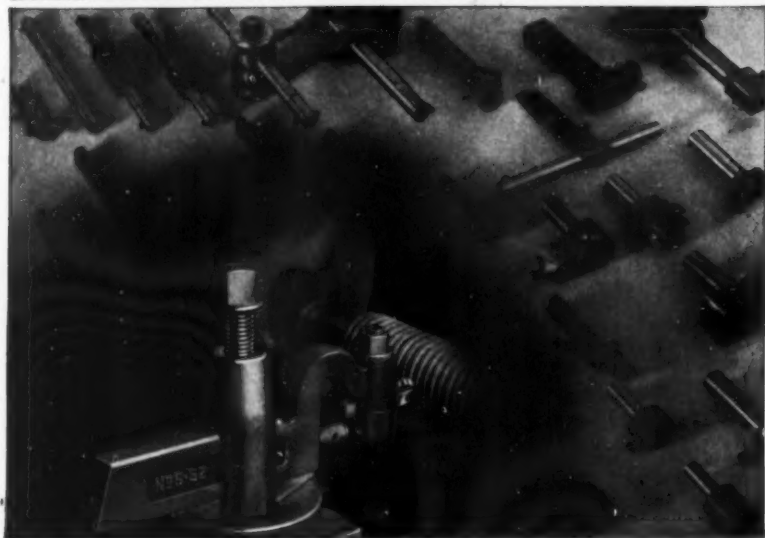
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Design and Use of Diamond Tools

By Philip H. Van Itallie *

Three types of diamonds are used industrially: — crystallized or **gem** stones; **bortz**, a round or imperfectly crystallized form with radiate or confused crystalline structure; and **carbonados**, or black diamonds, impure aggregates of small diamond crystals, forming a diamond rock of porous granular to compact texture and without cleavage. These main categories are further subdivided by diamond miners and users into smaller classes. For instance, particularly fine bortz of round form composed of crystals radiating from a common centre are known as **ballas**.

In machine tool applications, bortz are favored, because carbonados are porous and will not maintain a keen, smooth edge, while gem diamonds, used in jewelry, are not only too expensive but also too brittle. The radiate crystalline structure of bortz, especially of the brown or tan stones which have well-defined cleavage planes radiating from a common centre, is ideal for machining, sawing, grinding and other tooling operations, as well as for dies used in drawing fine, precise, hard wire.

Diamonds are used generally where the material to be machined is too hard for a steel tool or where greater accuracy or better finish is wanted than can be obtained when using steel or other man-synthesized materials for tools. To make a good diamond tool for such purposes, a careful selection of bortz is necessary and then a very careful positioning of the diamond in its holder so that a cleavage plane will be parallel to the top surface of the tool. The cleavage planes in good crystals are very pronounced, and are parallel to the faces of the crystal. In stones less well defined, it is necessary for the diamond polisher to shift the

stone around until he finds the grain by the ease with which grinding may be accomplished. **Follow the grain for easy grinding** is a safe rule, using diamonds as well as metal tools.

One way of making a diamond-pointed tool is to take the diamond and set and braze it into a steel holder. This method was described several years ago by C. L. Bausch of Bausch & Lomb Optical Co., Rochester, N. Y., in the Transactions of the American Society of Mechanical Engineers (MSP-51-16). The end of the holder is bored to fit the diamond and is then slit into a number of saw slits as shown in Fig. A. The diamond is then inserted in the hole and the tongues formed by the slots are pressed down to hold the stone, whereupon the diamond may be brazed into place.

Diamonds can be ground into almost any shape to meet the special requirements of the user of machine tools, whether he is building rolling mills for a steel works, presses for an automobile plant, printer's cylinder presses, air conditioning blowers and fans . . . or candid cameras and waterproof wristwatches. Special requirements, as we shall see, necessitate many shapes of diamond pointed tools; but for straight turning and boring a well-standardized form is used throughout industry. **Figure A** illustrates this form, found to give excellent results.

For turning tools, the angle **a** is made 45 degrees and angle **b**, 2 degrees. The face clearance of **a** is about 10 degrees, and of **b** about 2 degrees. This clearance angle of **b** varies somewhat with the nature of the work which the tool is required to do. On very hard material, clearance angle of **b** may be made as great as 5 degrees. For boring tools it is made

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5-8 degrees, depending upon the size of hole to be bored. In general, keep angle *b* as small as possible and still have clearance. No lip angle is ever given to the top of the tool for these purposes.

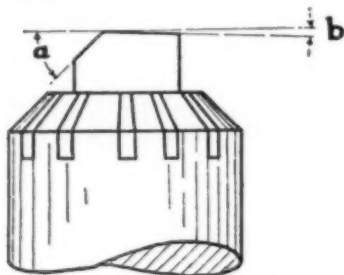
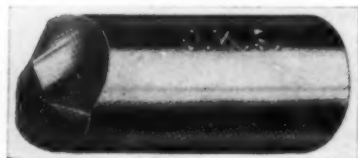


Fig. A. Diamond Tool for turning and boring with diamond brazed in holder.

Facing tools require more clearance than turning tools, but less than boring tools. Good practice is about 3-4 degrees.

Figure B, shown both by a picture and a drawing, represents a shaped diamond boring tool in one of its simplest forms. The diamond has a 90 degree included angle, with 10 degree clearance on the front face (called *a* above). The cutting edge of the diamond point has a 0.015" radius as shown.

This type of tool does a most satis-



factory job on a large percentage of the applications where diamond boring is suitable. Factors such as spindle speed, feed per revolution, and the amount of stock the user intends to remove, as well as the size of the hole itself, make it necessary to deviate from this simple shape in many instances, to achieve exactly the cutting finishing angle most desirable for the job you are considering.

Figure C represents another commonly used shape diamond boring tool. As its distinguishing features from B above, its radius is offset a bit to the right of the center line. The included angle for C is thus 85 degrees, and the radius 0.015" as before. In boring the wrist pin hole in automobile pistons, this type of a tool, with the diamond point offset, has been found most useful for finishing operations to achieve the precise dimensions required on the modern assembly line.

Figure D represents a third general type of shaped diamond boring tool, and, as shown by the illustration and drawing, may be called a "round-

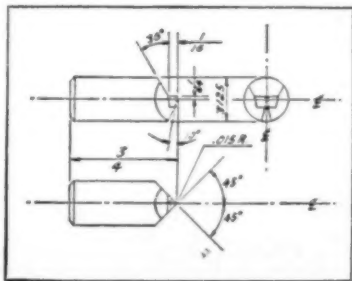


Fig. B. Shaped Diamond Boring Tool in one of its simplest forms. The Diamond has a 90 degree included angle—10 degrees clearance down the front—and a .015 in. radius on cutting edge. This type of tool should do a very satisfactory job on a large percentage of applications suitable for Diamond Boring. Factors such as spindle speed, feed per rev., and amount of stock the user intends to remove, as well as size of hole itself, make it necessary to deviate from this simple shape in many cases. Hence, before we know it, innumerable designs crop up and naturally this makes the subject of Shaped Diamond Boring Tools seem more or less complicated to the average layman.

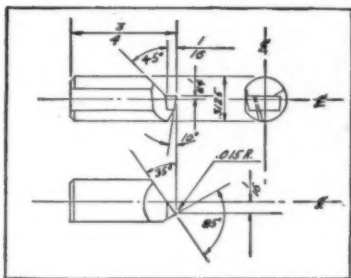
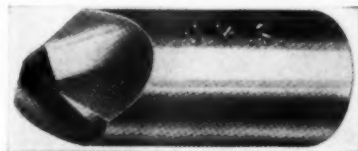
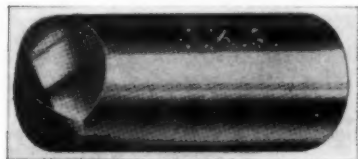


Fig. C. This is another commonly-used Shaped Diamond Boring Tool. The main difference from B is that the point, or more correctly the radius, is offset a bit to the right of the center line. The included angle in this case of 85 degrees and the radius .015 in. Experience has shown this type well suited for finished boring of wrist pin holes in automobile pistons.



nosed" diamond tool. The radius in this case is approximately $\frac{1}{8}$ ". Tools of this type are being used with great economies in turning large diameters; for example, calendar rolls used in paper mills are very often diamond turned with a tool such as D.

As we have seen, the diamond tool is often tilted to obtain a polishing, or burnishing effect. This offsetting is illustrated in general by Figure E. The turning tool, when used, is tilted around so that the angle *b* becomes smaller where coarse feeds are used or when a specially brilliant surface is wanted on the work. When setting the tool for the latter purpose, it must be kept in mind that this sort of finish requires really a burnishing operation after the cut is taken. The angle *b* is sometimes reduced practically to zero,



the tool is rotated so that the edge of the tool away from the cutting edge is higher than the latter, as shown in Figure E, which is a front view, looking at the work through the tool. This angle of tilt, *c*, may be as high as 45 degrees for very soft metals. Obviously, since boring is a straight-line operation, the tilting practice cannot be followed for boring.

Perhaps it might be well again to review some general concepts about diamond tipped tools and precision machines. A glance at the history of diamond boring reveals that this field

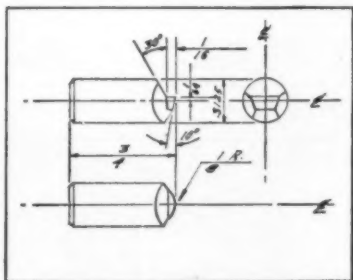


Fig. D. This third type is generally referred to as a Round-Nosed Diamond Tool, the radius in this case being approximately $\frac{1}{8}$ in. This type has been found very satisfactory for turning large diameters, such as calendar rolls for paper mills.

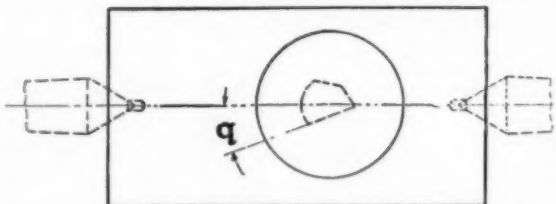
was relatively unexplored until about 1914, about the beginning of the World War. At that time, Liberty motors for airplanes became such a necessity that diamond boring was developed in a more or less crude way to fill the gap left by ordinary machine tools, where tolerances required the precision only a diamond can give. Liberty motors had seven bearings, and to align them was a tremendous problem. Various types of bars and reamers were used with no great success. It was probably Nordyke-Marmon who first conceived the idea of using a diamond tool and bar to finish-bore these seven bearings. Later Packard and Cadillac both building motors, including the Liberty motor, during the War, adopted this diamond method; and gradually diamond boring became more generally accepted. Nordyke-Marmon continued to use diamonds for auto parts after 1918, and Cadillac designed and built a machine to diamond bore their own

ment proved excellent for its time, but, like most other early efforts, was limited in its productive field, that is, the variety of parts which it could machine; and also in its productive capacity.

By 1930 several manufacturers of diamond boring equipment had developed precision boring machines, and were finding a market for them among automobile manufacturers, Ford, General Motors and Chrysler, as well as many makers of auto parts, of airplanes, tractors and trucks, of air conditioning equipment, steel and paper mill rolling and finishing stands, and to makers of moving equipment in every industry where precision is important.

Since then, tool forms have been widely extended to meet fabricators' needs, to meet the variety of demands made by manufacturers who utilize several hundred steel alloys, aluminum, nickel, tin, and other metal alloys. The projectograph, a machine used for

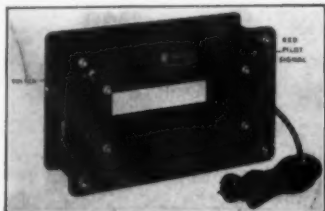
Fig. E. Tilting of tool to obtain burnishing effect,



automobile and truck parts.

Packard, also pioneering, went to an experienced engineer named Coulter, who helped them build the Coulter diamond boring machine. This equip-

checking included and cutting angles of the shaped diamond tool, has proved a boon in inventing new shapes of diamond points to answer the machining requirements of high-speed production.



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By definition, a shaped diamond tool is a cutting or machining tool where the cutting medium, or the part that does the work, is a diamond. In other cutting tools, the cutting edge may be tool steel, stellite, tungsten carbide, etc. Like other cutting tools, the shaped diamond tool has a definite shape or contour, as we have seen; and from this shape is derived the name. The adjective "shaped" also distinguishes it from the commonly known diamond dressing tool, used for the dressing and truing of grinding wheels. These two types of diamond tools should not be confused, since each has its own special uses; and beyond the fact that both utilize diamonds for the tool point or edge, there is no connection.

We noticed that modern automobile manufacturers, for example, use shaped diamond tools for such purposes as finish boring the bronze bushings in the wrist pin end of connecting rods. For this latter use (See **Figure B**) the following specifications are typical:

- (1) Included angle—90 degrees.
- (2) Radius of cutting edge—.015 inch.
- (3) Clearance or undercut of the cutting edge—10 degrees.

We have observed, too, that such specifications define an exact shape, within the tolerances allowable. What do these specifications mean?

The **included angle** is the angle between the two upper edges of the diamond when you are looking down on the **table**, or flat part, of the stone.

The **radius** is the size of the curve—part of a circle—which has tangent

to it the two upper edges of the diamond, the same edges which form the included angle. The radius serves to "round out" what would otherwise be a sharp point. For most machine tool work it is well known that sharp points are too delicate or fragile, and also tend to wear away too rapidly.

The **clearance** or **undercut** is the angle between a line perpendicular to the table of the diamond and the line formed by the intersection of the right and left sides of the diamond. In other words, the clearance is the angle between the vertical and the vertical projection of the stone.

A diamond obtains its **shape** by being cut or polished by a diamond cutter, who is, in a sense, an industrial jeweler—the same sort of artist as the one who cuts and polishes beautiful gems for milady's manicured fingers. Not only are the workmen allied, but the equipment used in both cases is identical.

Due to the exacting requirements of the manufacturer who uses shaped diamond tools, the cutting of industrial diamonds for this purpose is probably more difficult than gem cutting. After all, even Mrs. High Society is satisfied with a stone which has pleasing proportions, plus life, fire and brilliance. A good gem cutter can soon learn to "make" all the small facets required for this artistic effect with a minimum of trouble, by guess and by eye.

Cutting a shaped diamond for use in machine tool work, however, is truly scientific in each step. The projectograph, which magnifies the shape of the diamond about 75 times, is used to check the included angle within a frac-



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tion of a degree; and the radius of the stone, too, by means of the projectograph, can be accurately measured within plus or minus 5 ten thousandths of an inch.

In shaping a diamond for industrial uses, there are three principal steps:

(a) The **table** or flat part is cut or polished from the original stone.

(b) The proper **undercuts** are cut or polished on the right and left sides of the stone, to give the diamond the desired included angle and the requisite clearance on the cutting edge.

(c) The **radius** is formed and polished; and then the stone is given a final working on the lap to smooth the table and achieve a smooth cutting edge.

As we saw, clear bortz diamonds, either African or Brazilian, are best suited for making shaped diamond tools. The essential factor in selecting a diamond for shaping is that the material be "cuttable." That is, the diamond must have such a structure that the cutter shall be able to "make" the table, included angle and radius desired: the diamond must, as cutters say, "run on the wheel." For example, certain types of gros-grained or knotty diamonds will not cut readily and are occasionally impossible to cut. Some **ballas** diamonds are of this type. Also, stones which have large imperfections, flaws or other impurities are not good material for machine tool use.

A few applications arise where a diamond harder and tougher than the ordinary bortz is required. For this purpose, carbonados or "Brazilian Carbons" are satisfactory. Carbonados may be shaped into excellent diamond-tipped tools, with these disadvantages:

(a) Carbonados cost more per carat than bortz, in the rough.

(b) Since carbonados are harder, they are correspondingly more difficult to cut or shape, and thus the labor cost is greater.

For these reasons shaped diamond tools containing carbonados are used only when a bortz tool is entirely unsatisfactory.

Why use diamonds instead of ordinary cutting or machining tools?

There are two principal reasons, two

economy factors which mean savings to every industrial user of machine tools when he picks the right diamond tool for the correct purpose.

First, ordinary cutting tools wear away too fast, whereas diamonds, the hardest substance known, outlast other materials by a wide margin.

Second, on a great many precision finishing operations, there is no other substance which will give the precise boring or turning, say, obtained when you use a diamond cutting edge.

Machine tool users have used alloy steels, tempered tool steels, where possible; for further precision, they turned to such products as Stellite or tungsten carbide. For the utmost accuracy, however, industrial engineers who specify machine tools find no cutting material that compares with diamonds. Diamonds are supreme, just as the hardness of the diamond is unchallenged!

Machine tool users have found in recent years that a diamond, correctly shaped, will give them a better finish and a greater uniformity on large runs—each piece machined will be identical with its predecessor within extremely small limits of error. Diamonds used industrially for machine tools not only wear longer and give lasting precision with one set, but they might be considered imperishable except that occasionally a diamond will chip.

Chipping usually occurs when the tool edge hits a hard spot or a hole, thus causing an interrupted cut. In either case the diamond may be chipped on the cutting edge, whereupon it must be relapped (cut and polished), again before the tool is used again. On the other hand, one automotive manufacturer has recorded a run with a single diamond tool which machined wrist pin holes on over 200,000 pistons before the diamond was chipped and needed relapping!

In using shaped diamond tools, equipment for holding and turning must be of the best. Most important is the spindle, which turns the boring bar containing the diamond tool. This spindle must be made well, and must be as free from vibration as it is humanly possible to accomplish. The

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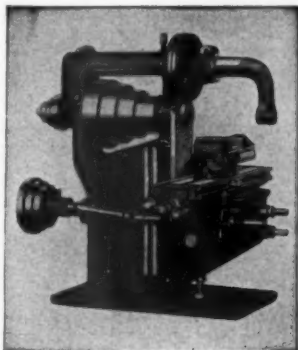
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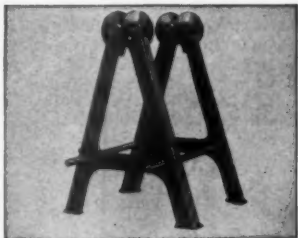
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BALANCING TOOL



BENCH CENTER

RIGIDMILS - STUB LATHES

3-Wheel Tool Grinders - Centering Machines
Balancing Tools - Bench Centers - Special Machines



Bausch & Lomb Optical Co., makers of precision instruments and large users of industrial diamonds, have found that the main limiting factor in the useful life of a diamond tool **per run** is **vibration**. That is, if a shaped diamond tool is to machine 200,000 parts without re-lapping, vibration must be held to a minimum.

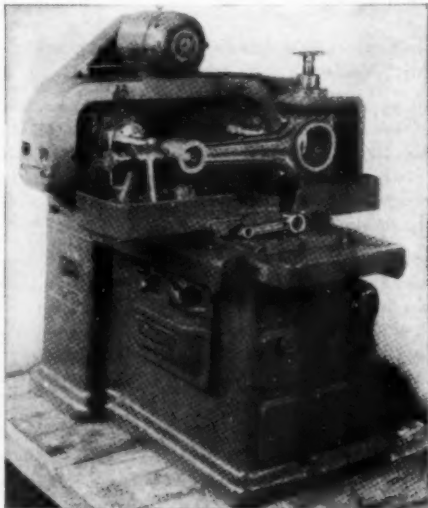
Several machine-tool builders have awakened to this fact, and have for some time been building special machines for diamond boring and turning. Big, generous bearings are needed, of rugged, ball-bearing construction. For turning work between centers, dead-center lathes with a spring pressure on the tail center have been found satisfactory, not on heavy work, but on parts up to about 4" in diameter and 6-8" long.

Where this latter practice cannot be followed, or where ball-bearing spindles cannot be used for some reason, the turning machine must have well-fitted bearings and should be "run in" to normal operating temperature before really accurate work can be attempted. Bausch & Lomb have found, using these precautions to eliminate vibration as much as possible, that hard cast-bronze periscope leads 12" in diameter and about 30" long may be machined finished to within 0.0002" over their entire length. This particular job required two cuts, one on the rough casting and one finishing, running at 210 r.p.m. with a feed of 0.007" per revolution. A clearance angle of 5 degrees was used on the tool, using the same tool for both the roughing and finishing cuts.

In general, where machines are available, higher speeds than those cited above, and a finer feed, are desirable, since diamond-pointed cutting tools work best at comparatively high speeds, usually around 3000 r.p.m. Because of the high speed desir-

able, spindles must be rigid to avoid chipping; and if the whole machine is rigid, cuts can be taken over depressions and holes, over which the tool must jump, without appreciably affecting accuracy.

The speed of turning is practically independent of the material being turned, several manufacturers having turned everything from soft babbitt to



An interesting application of the use of Shaped Diamond Boring Tools. The connecting rod being machined is about three feet long. (For comparison, an average automobile connecting rod is shown below.) Both the large and small ends (four and six inches in diameter respectively) are precision bored using a Shaped Diamond Tool, and these operations are done simultaneously. Material of the wrist pin end is bronze, .010 in., of stock is removed on the diameter at a spindle speed of 1200 r.p.m. and a feed of .005 in., per rev. Material in the large or crank pin end is babbitt and .008 in., of stock is removed on the diameter at a spindle speed of 800 r.p.m., with a feed of .002 in. per rev. Actual shape of the Diamond Tools used was determined, as is usually the case, by the Engineering Dept., of the machine tool builder.

Now . . . Two Models

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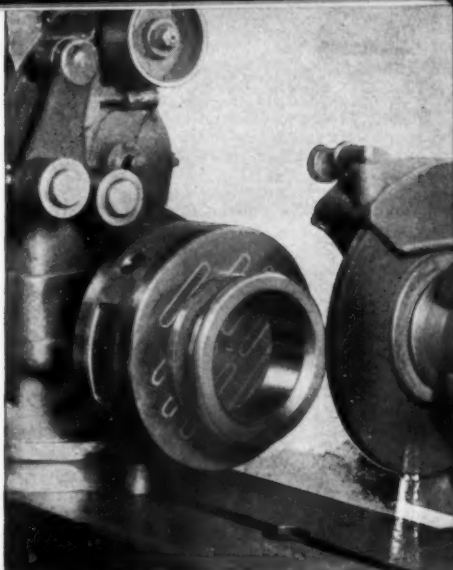
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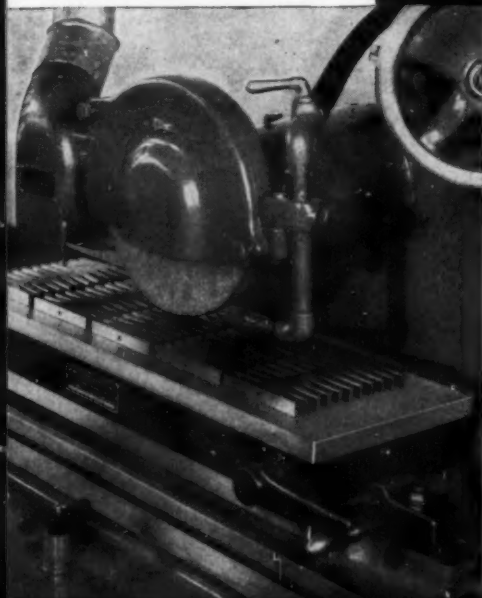
Rotary Model

(ABOVE)

. . . a new addition — for face, disk, external and internal grinding — also for light cuts on lathe work and other operations.

Working face—9" dia.

— Ask for Circular —



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(LEFT)

. . . besides their popularity for Surface Grinding — wet as well as dry — these chucks are readily portable for many uses.

Three sizes —

5"x10" 6"x18" 8"x24"

Adapter Plates available for holding Small Pieces — Ask for Circular —



Brown & Sharpe Mfg. Co.
Providence, R. I., U. S. A.

BROWN & SHARPE

hard bronze that a steel tool would hardly touch, at substantially the same speed, provided vibrations do not occur. With proper machine design and careful technique in the setting of the tool, truly wonderful results may be obtained. Turning and boring accuracy to within one ten-thousandth of an inch has been recorded by many shops where precise work is done; and beautiful mirror-like finishes are the rule. Costs can be reduced greatly because of the many parts machined at one setting of the tool, and hence frequent regrinding and resetting are eliminated, the need for inspection is minimized; and, best of all, the finished product is a work of art, a masterpiece seldom needing the expensive polishing which so often elevates machining costs. Work coming off the diamond turning lathes, if carefully handled, usually goes direct to the lacquering department, if paint is to be applied!

The use of diamond tools lends itself very successfully to the finishing of thin, flat parts that are ordinarily difficult to clamp without distortion. Using a diamond that has no lip angle and hence no lifting component, it is possible to machine parts of this kind by clamping them very lightly against the edges.

Before considering the variety of machining operations where shaped diamond tools have been used with extreme satisfaction, both in performance and economy, let us review for a moment the reasons why diamond tools for different purposes are cut with different tables, radii and clearance angles; and are

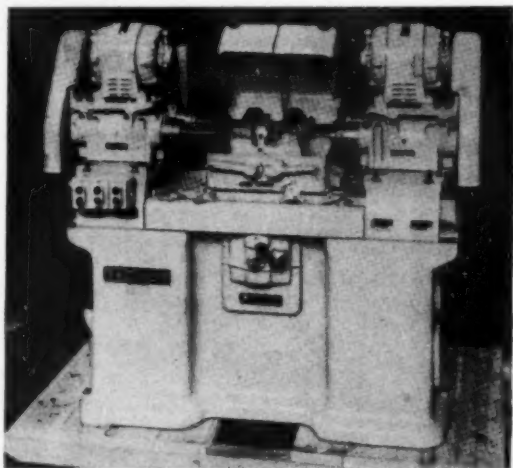
often set at varying angles for various materials.

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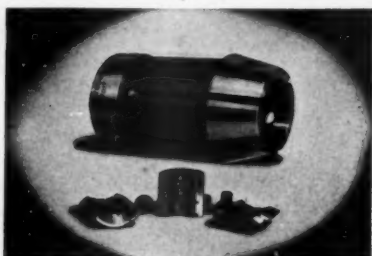
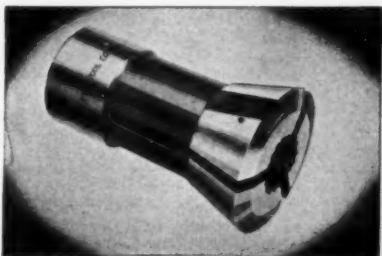
The chief variables for diamond-tipped tools are:

- (1) The hardness of the diamond.



Diamond Boring application where parts machined are very small. Material in this case is a die casting (a non-ferrous metal) and the small holes are finish bored, using Shaped Diamond Boring Tools. On smaller holes, speeds are usually considerably higher — in this case, being 3600 r.p.m., with a .0015 feed per rev.

For a Better Grip on Screw Machine Profits



Sutton **DIAMOND-GRIP** Collets

◆ When you are checking the factors that will give you better control of profits from screw machine production, investigate the advantages that collets with deep, clean-cut Diamond-Serrations will give you.

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◆ The complete Sutton Catalog of screw machine accessories lists **DIAMOND-GRIP** Collets for all screw machines in three styles: single-piece, master, and compensating master for hot-rolled stock.

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Only Sutton Diamond-Grip Collets are Diamond-Serrated

- (2) Direction of the cleavage planes.
- (3) Shape of the tool.
- (4) Clearance angles.
- (5) Setting of the tool for height and angle.
- (6) Speed of work.
- (7) Depth of cut.
- (8) Type of feed.
- (9) Physical characteristics of the material being machined.


In preceding paragraphs we have discussed all the above variables except the last, the material to be machined. Even different samples of the same material often machine altogether differently, and hence the behavior of the material is important. Diamond shaped tools for machining have been applied most successfully to all sorts of non-ferrous metals, to plastics, hard rubber, fibrous materials, etc. In addition, it has been found that with a rigid spindle and the proper tool, steel parts may be machined, provided that the steel is correctly heat treated for machining and is no harder than 26 Rockwell C. This latter hardness limit

is by no means absolute, but marks the beginning of a range where the efficiency of the diamond tool tapers off.

Below is a list of applications where shaped diamond tools are now being used to achieve excellent products at the lowest machining cost:

- (1) Finishing piston wrist pin holes.
- (2) Finishing large end of connecting rods (mostly for automobile motors, but also for many other uses).
- (3) Finishing small ends of connecting rods.
- (4) Turning motor pistons (material, of course, must be some non-ferrous metal; for example, an aluminum alloy).
- (5) Finishing all kinds of small holes, where material is non-ferrous metal such as: (a) bearings for electrical motors, (b) small parts for automobile motors like valve body or oil pressure body, (c) bronze bushing for refrigerator parts.
- (6) Turning the face of a refrigerator seal nose to obtain an extremely high finish.
- (7) Turning and boring hard fibrous and molded materials.
- (8) Turning bowling balls and billiard balls.
- (9) Turning and boring all kinds of articles made out of hard rubber.
- (10) Turning and boring fountain pen barrels of many synthetic and natural materials.
- (11) Turning vulcanite pipe stems.
- (12) Turning and facing small watch parts; for example, the balance wheel.
- (13) Turning and finishing optical parts for cameras, telescopes, microscopes and other instruments.

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POWER
PRESSES**

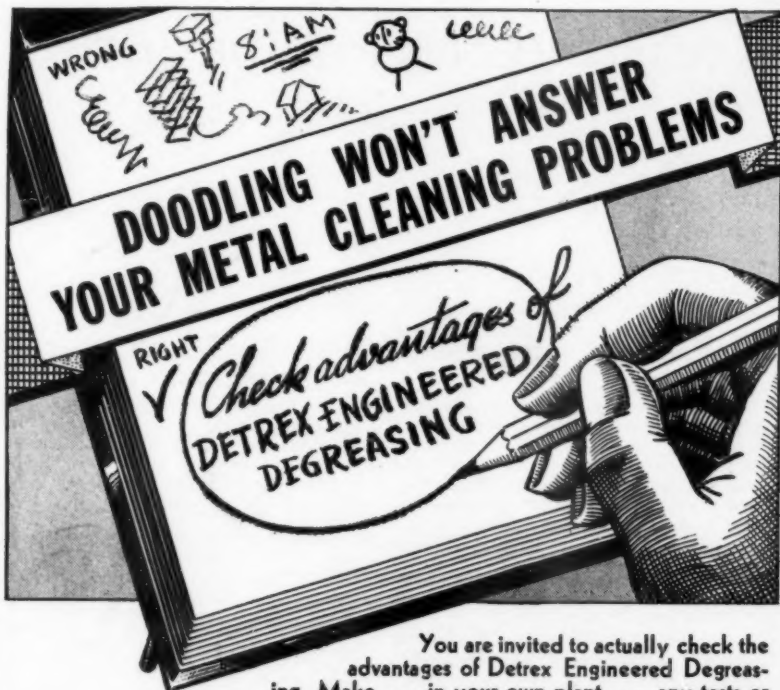
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TOOL & MACHINE CO.**
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Remember—this most positive and efficient method for removing oil, grease and other contamination from all kinds of metal products requires less time, less space, and it lowers total cleaning costs.

Tell us about your cleaning requirements—and we'll give you recommendations . . . at no obligation, of course.

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Branch Offices in Principal Cities

Comments From The Editor

A flower unblown: a book unread: a tree with fruit unharvested. A path untrod: a house whose rooms lack yet the heart's divine perfumes. A landscape whose wide border lies in silent shade 'neath silent skies. A wondrous fountain yet unsealed: a casket with its gifts concealed. This is the year that for you waits beyond tomorrow's mystic gates.

Horatio Nelson Powers.

At this time, many of us pause and reflect on the New Year to come. It offers 365 days of opportunity. Much that we can do will influence or mould the opportunities ahead. Here's hoping we'll recognize the opportunities and make the most of them.

Meanwhile, may the good resolutions last longer than usual . . . and may the New Year bring the best of everything for our family of BLUE BOOK readers and advertisers.

More Than the Printed Word . . .

Advertising is not confined to the printed word. It begins back in the shop, extends all through the office and projects itself into the correspondence every day. A worthy product or a worthy service should be the basis of all advertising. An attractive office, courteous salesmen, a telephone girl with a smile in her voice, neat letters on good stationery and promises that are kept . . . all of these are advertisements just as surely as words painted on display boards or printed in magazines.

Every business transaction is an advertisement. A satisfied buyer returns for more and there is no cheaper way of landing and holding business. It is easier to hold established customers than to get new ones.

Many a business has been carried

through a killing frost by a reputation for square treatment and fulfilling of all promises and obligations.

Where is the profit in advertising prompt, helpful, courteous service if delivery promises are broken repeatedly . . . if the salesmen are pessimists and if correspondence is ignored or carelessly handled? In other words, this is a plea for truth and sincerity in advertising.

Have You Sold Some of These? . . .

Customers may be classified into many types. Occasionally a successful approach may be applied to another prospect of the same type. Care should be exercised though for sometimes there are marked variations within the different types themselves.

Often you meet a good-natured prospect. He is inclined to smile at your efforts. Join him in a laugh or a smile.

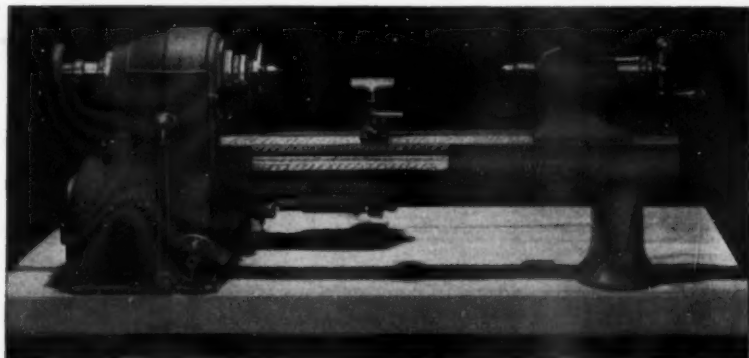
Then there is the doubting customer. He raises questions and objections to every statement. Often he proves difficult but printed figures and facts help to combat his queries.

Taciturn customers are difficult. There's no way of telling by word of mouth whether or not you have aroused interest. Study the eyes of these fellows and do not oversell.

Still another type is the technical customer. To admit that you "guess" or "think" generally means a flop. You must **know** and be **sure** of your facts when confronting these fellows.

Another type is the fellow unable to say "Yes!" For him, you sometimes have to act as salesman and buyer. With him, it is well to close just as soon as sufficient interest has been aroused.

This doesn't begin to cover all of the classifications and the procedures are not sure-fire. The approaches recommended will be found to work often enough to encourage further testing.



NEW--"Stark" Integral Drive Precision Bench Lathe

PATENTED

Is the first tool of its class with built-in motor and speed changing mechanism, entirely eliminating mill wrighting.

Nothing under the bench . . . nothing overhead.

The $\frac{1}{2}$ h. p. geared motor drives through a disc clutch and vertical V belt sheaves, and through V belts to the headstock, giving any speed at the turn of a wheel (located in front of lathe) from 156 to 2200 r. p. m. in Standard Model, and 260 to 3500 r. p. m. in High Speed Model. Speeds registered on a neat indicator.

Simply moving control lever to right engages the clutch, vertical position releases, moving to the left instantly brakes the moving spindle.

Time-tried Stark double taper bearings in Standard Model for precision laboratory, toolroom and die work.

Best precision pre-loaded anti-friction bearings in High Speed Model, for manufacturing.

Both $\frac{3}{4}$ and 1 inch collet capacity furnished in either model . . . 9 inch swing . . . 40 inch length of bed . . . Weighs 310 pounds . . . Takes regular Stark Attachments, Collets and Chucks.

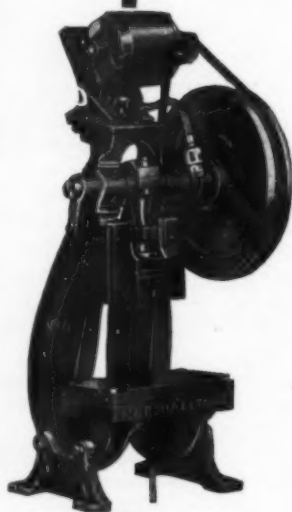
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SOLVENT DEGREASING

By W. W. Davidson, Vice President
Detroit Rex Products, Co., Detroit, Mich.

SOLVENT degreasing, as it is known today, is a comparatively new art. Rapid developments have been made in the art through recent engineering research and industrial applications.

The solvent degreasing process is now being adopted by leading manufacturers of all kinds of metal products—both ferrous and non-ferrous—for the removal of oil and grease from products prior to finishing (including plating, lacquering, painting, and rust proofing), inspection, and heat treating. The products degreased range from hypodermic needles up to large automobile body parts and refrigerator boxes.

The process is quite simple, as it depends merely upon the dissolving of oil and grease by a stabilized, non-inflammable, chlorinated, hydrocarbon, either in the heated liquid or vapor state. For the most effective use of these solvents, properly designed degreasing equipment is essential. The fundamental principles to be followed will be outlined by referring to the three basic types of degreasers now in general use. These are known as (1) vapor, (2) immersion and (3) spray types. Depending upon the kind of work to be cleaned, any combination of these three types may be incorporated in one unit.

Vapor Degreaser

The simple vapor degreaser consists essentially of a chamber in which the liquid solvent is boiled, a space above this boiling chamber to hold the hot vapors (in which the work is cleaned), and a condenser to maintain the vapor level in the apparatus.

The condenser around the upper

portion of the vapor chamber—in this case a water jacket condenser—cools the solvent sufficiently to liquefy it. It is then returned to the desired chamber in its liquid state. This condenser is balanced against the heat input and, as the vapor is $4\frac{1}{2}$ times as heavy as air, it is readily retained in the apparatus.

In this vapor method of degreasing, the work to be cleaned is lowered into the vapor only. While in this position, as the work is colder than the vapor, the chemically pure solvent vapor is condensed on it. The power of the vapor action depends greatly upon the difference in temperature between the metal and the solvent vapor which is at about 188° F. (87° C.) The condensate continuously washes the metal surfaces as long as the work remains in the vapor, but the washing effect is greatly diminished as the temperature of the metal approaches that of the vapor.

Important advantages of the vapor method of cleaning are:—its extreme simplicity; less expensive apparatus; and only pure solvent vapors will reach the work, no matter how contaminated the boiling solvent becomes, because of the decided difference in boiling point between the dissolved oil or grease and the solvent. After having been vapor degreased, the work is removed from the machine, free from oil and grease, warm and dry. The complete cleaning cycle generally requires less than a minute.

In the cleaning of large pieces of light gauge metal by the vapor method, the bottom of the work is heated first by the vapor and this heat has a

tendency to be conducted up through the metal before the vapor has a chance to condense uniformly on the upper portion of the work. This causes oil "runs" and stains.

In addition, cupped or intricate shapes and beaded work have a tendency to trap the oil and the solvent, as well as to permit air pockets, which exclude the vapors. There is practically no mechanical action in vapor degreasing and, accordingly it is not effective in the removal of particles insoluble in the vapor. The vapor method is limited to about 10 per cent of degreasing applications.

Immersion Degreaser

When the work is lowered into the boiling solvent, a more positive degreasing action is obtained than with the straight vapor method. The continuous sweep of the boiling solvent over the work gives a washing or scrubbing effect that assists in the removal of solid particles insoluble in the reagent. Therefore, immersion type degreasers are used quite ex-

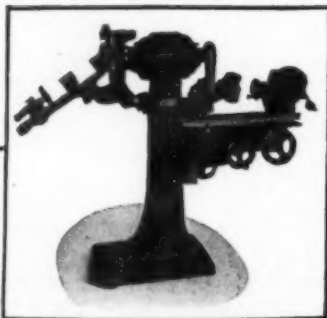
tensively. They are commonly designed with either two or three chambers. The usual sequence of cleaning operations in these machines is: first, immersion into the boiling solvent to remove heavy grease and dirt; then into a chamber with clean solvent to rinse and cool the metal; and finally a pure vapor rinse. Drying is effected as the work is removed.

In the two-chamber machine, Fig. 1, the second or cool chamber (separated from the first or boiling chamber by a low dam) collects the condensed vapor as it flows from the water-jacket condenser zone. It thus serves as a reservoir for clean solvent which, in turn, is constantly flowing over the dam into the heating chamber.

Although the solvent in the heating chamber does become contaminated in the course of time, that in the rinse chamber is constantly renewed by the continuous supply of clean solvent condensate.

The temperature of the liquid solvent in the second or rinse chamber is lower than that of the boiling solvent and that of the vapor in the machine. This temperature difference is maintained by the open air space separating the chambers. Submerging the work into the second chamber lowers its temperature so that a final vapor rinse, reheating and drying are effected as the work is removed from the machine. Such a cycle assures high quality cleaning, is equally effective on light gauge as well as heavy gauge metal, or parts of intricate design.

A third chamber, as illustrated in Fig. 2, is added where it is desired to provide straight line operation for the boil-rinse-vapor cycle. This chamber holds vapor only, and the condensate is returned to the boiling chamber by gravity or by mechanical means. In the machine shown, a motor-driven solvent transfer pump returns the solvent to the boiling compartment to maintain constant solvent levels. This pump is also used for the transfer of solvent from any one chamber to any other chamber when cleaning the



**No. 2 GRAND RAPIDS
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GALLMEYER & LIVINGSTON CO.

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GRAND RAPIDS, MICHIGAN

machine and distilling the solvent. Or it may be used for filling the machine.

Vapor-Spray-Vapor Degreaser

In some cases, the mechanical cleaning action produced by the roll of boiling solvent over the surface of the work is not sufficient to satisfactorily remove insoluble material from the work; therefore, the spray method is employed. The vapor-spray-vapor type of degreaser, is the most positive method of removing caked-on or insoluble material. In this design the work is first wet with the solvent vapors. Then hot solvent is pressure-sprayed onto the work, thus mechanically removing and driving off the solid particles. The spraying operation is then followed by a final vapor rinse to insure complete removal of oil or grease, and at the same time drying of the metal article as it is brought out of the machine.

Conveyors

When the volume of work justifies it, any of the types of degreasing machines mentioned may be made completely automatic by the use of suitable conveyors and temperature control equipment. Fig. 3 shows a return type, monorail conveyor through a vapor-spray-vapor machine. Monorail and belt conveyors of "through" design may also be used. Fig. 3 shows a through-type cross rod conveyor in a three-dip machine, which can be loaded or unloaded at either

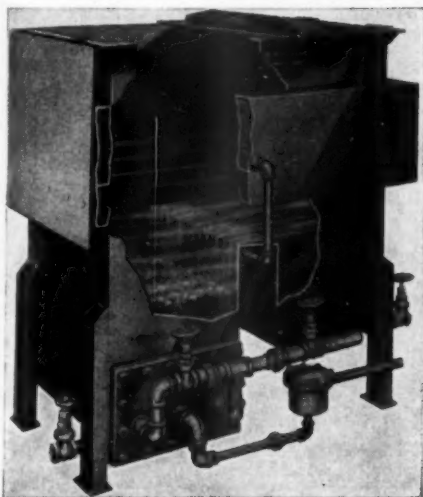
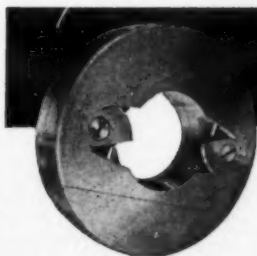


Fig. 1—Cutaway view of steam heated two-dip degreaser, showing solvent and vapor levels during operation, water jacket condenser and distillate collecting trough.

end. This style of conveyor is also built with the return of the conveyor, inside the machine, to a loading and unloading station.

Solvent Stills

Properly designed degreasers are self-distilling for reclaiming the solvent after contamination. That is, the degreaser itself can be used to distill and



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lathes

SENECA FALLS Automatic WORK DRIVER

Self Centering... Quick Acting... No Slip. Attaches to any chuck plate or spindle. Provides a slip-proof, balanced drive reducing chatter. Handles rough forgings or turned pieces—straight or taper. Eliminates dogging time. Reduces tool breakage. Write for details and size range.

SENECA FALLS MACHINE CO., 314 Falls St., Seneca Falls, N. Y.

thus re-purify the solvent when necessary (depending upon the contamination caused by the work). With some types of work, however, especially in the case of those installations where it is not desirable to interrupt production or where the oil or solid contamination is very heavy, the use of a solvent still, Fig. 4, is recommended. Solvent stills are used to remove solids and oil contamination from the solvent after or during use. They are designed so that they may be run continuously or intermittently (batch operation).

They are equipped with a separator for removing any water with which the solvent might become contaminated during use, a motor driven solvent-transfer pump, constant level device, a gauge glass, and thermometer. They are built with a steam injector so that practically complete solvent recovery is possible.

Operating Costs

It is difficult to give positive cost figures due to the multiplicity of operations and widely varying conditions in

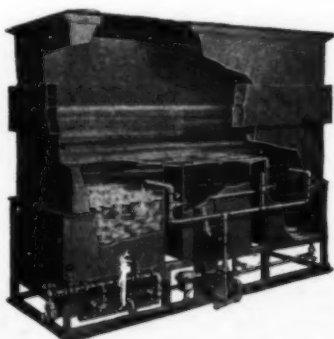


Fig. 2—Three-dip degreaser which gives straight line sequence of cleaning operations, consisting of immersion in boiling solvent, immersion in clean cooling rinse and final vapor rinse.

different industries. For instance one manufacturer reports total costs of 17 cents per ton of work including solvent, labor, overhead and other expenses. This is for a high production on sheet metal products with practically no carry out or drag out. Another manufacturer, who is cleaning intricate parts on a very low tonnage basis, has a total cost of \$1.10 per ton. Even at this cost he reports a very great saving over previous methods.

On an average the total cost may be figured on a basis of 60 to 70 cents per ton of work which is considerably less than for other cleaning methods when all factors are considered.

Complaints of excessive costs are usually due to abnormal solvent losses caused by improper operation of the equipment.

Principles of Design

Some of the various types of degreasers and the solvents have been briefly described, so that the most interesting design problems can now be considered. Degreasers are built according to definite principles as determined by the laws of chemistry, physics and mechanics. From an operating standpoint, the height of a degreaser is sometimes found objectionable. This, however, is definitely



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Air-O-Chek Valves are totally different because the exclusive ball and socket joint with internal actuating lever gives smoother, quicker and easier regulation. Leak-proof — they save air. No packing glands, external levers or buttons. Simple design and quality construction minimize maintenance.

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determined by the size of the work, and the necessity for constructing the machine so as to insure most economical operation.

The side boards, or the portion above the condenser, are required to prevent the effects of cross air currents which tend to carry out solvent vapors. There is a definite relation between the side board height and the exposed surface area.

Condenser Construction

The cooling means used to hold the vapors inside the degreaser is usually a water jacket or condenser coil. Cooling coils give a fast flow of water, are comparatively inexpensive to install, and have a slightly greater condensing effect than a jacket type condenser.

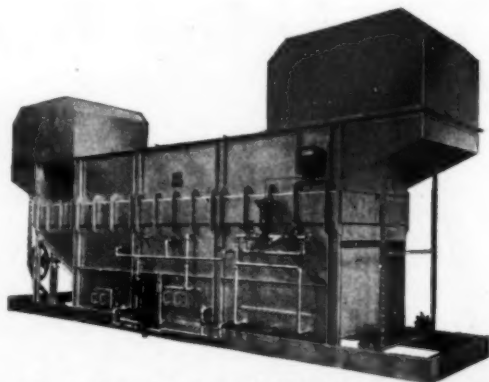


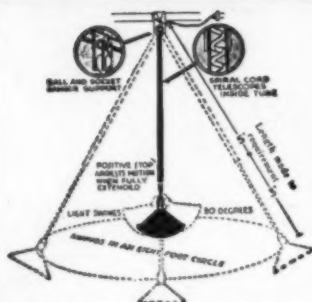
Fig. 3—Automatic three-dip degreaser with through type cross-rod conveyor. The return flight of the conveyor in this particular installation is beneath the machine, and it can be loaded or unloaded at either end.

However, with coils, the flow of the cooling water must be from the top to the bottom to avoid hammering and, naturally, the upper coils are the coldest. This causes a sweating action inside the machine due to the condensation of moisture from the air. This excessive moisture is detrimental to the operation of the degreaser, causing excessive solvent losses due to lowering of the boiling point.

With the water jacket condenser, on the other hand, the flow of water is from the bottom to the top. Therefore, the portion of the jacket above the interface vapor-air is at a temperature higher than the moisture condensation point, thus preventing the precipitation of moisture from the atmosphere. The temperature of the cooling water is effectively controlled by means of a valve on the inlet side. With the larger machines, a multiplicity of inlets and outlets is used to effect uniform distribution of the cooling water and assure maximum operating economy.

Experiments show that the water jacket is 25 to 30 per cent more efficient than coils from the standpoint of solvent losses. The water jacket, moreover, prevents the upper side walls

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The sturdy, rigid construction of the MULTIDUTY assures long, useful service. Simplicity and ease of operation make it practical for any plant. If you have any handling problems, MULTIDUTY is the solution. Let us tell you how MULTIDUTY can help you cut costs.

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of the machine from becoming heated by conduction, thus giving an effective condenser even to the top of the machine.

Heating Means

While steam is generally preferred as a heating medium, gas and electricity are used successfully in a number of installations. Steam may be used at pressures of from 3 to 20 pounds (200-1,400 g./cm.²) and it is generally the most economical. Steam coils are welded to removable clean-out doors. This facilitates the cleaning of the bottom of the boiling compartment and coils when necessary. The coils are raised off the bottom to leave a quiescent zone and reduce the deposit of insoluble material on them.

Gas heat is quite frequently used where steam is not available. It, however, is not very satisfactory unless properly handled, because the solvent vapors, even at low concentration in passing through a direct flame, break down and form hydrochloric acid. It is, therefore, apparent that a proper stack must be used to carry off the products of combustion. The stack should reach above the top of the building to insure proper draft, and be equipped with a back-draft eliminator to prevent the

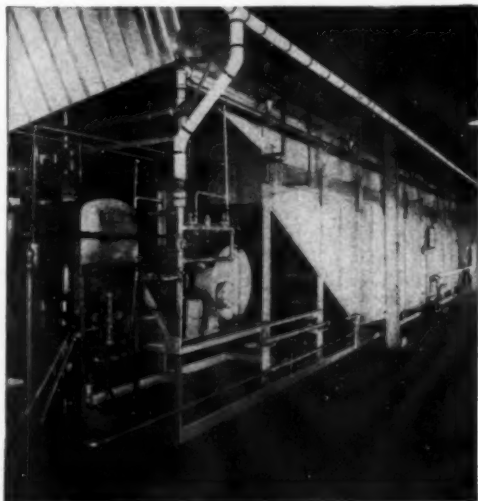


Fig. 4—Solvent still that may be used for batch or continuous reclaiming of solvent, is shown here applied to a large automatic vapor design of degreaser equipped with double monorail conveyor of "through" type.

products of combustion from being returned to the building. In plants where it is necessary to use gas, the installation of a tile stack outside the building is generally recommended.

Another design detail which is important is that the inside bottom does not become insulated with insoluble



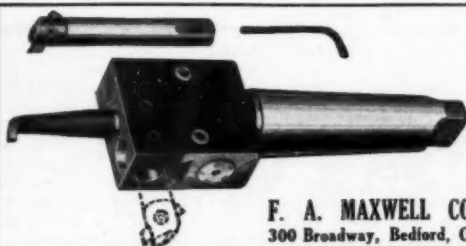
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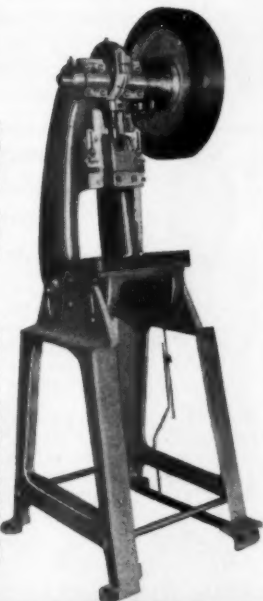
The new No. 1 Rousselle is designed especially for trimming deep die castings and all other types of deep draw work, which formerly required large, heavy presses because of the long stroke needed.

With automatic feed, 10,000 operations per hour are possible. NON-REPEAT clutch stops after each stroke, or can be made to operate continuously.

Check These Specifications:

Weight	450-lbs.
Crankshaft diameter at main bearings	4"
Diameter of crankshaft	1 1/4"
Flywheel weight	120-lbs.
Speed	300-r. p. m.
Diameter of flywheel	16 1/2-inches
Ram standard stroke	2-inches
Adjustment of ram	2-inches
Size of bottom of ram	3x3"
Ram to bed; stroke down adjustment up	6 1/2"
Size of hole in ram for punch	1 1/4"
Bed size	8x12"
Depth of throat to center of ram	4-inches
Size of opening between press frame at back	6-inches
Inclinable angle from right angle	30-degrees
Height	36-inches
Thickness of bolster plate	1-inch

Write for bulletin giving complete information.



DAVID J. ROSS & CO.,

**BENTON HARBOR,
MICHIGAN**

matter. This naturally reduces the heating efficiency, but at the same time quite frequently causes solvent breakdown due to localized overheating. Degreaser manufacturers install thermostats in the boiling compartment and construct the bottom of the machine of heavy boiler plate. The bottom thermostats are usually set at a temperature of 250° to 270° F. (121° to 132° C.) to prevent overheating. Even with this precaution, overheating will occur if the bottom of the boiling compartment is not kept comparatively clean.

Oil-immersion, electric heaters work out satisfactorily, providing the user keeps the heating elements clean at all times. Otherwise, incrustation will act as an insulator, reducing the heating efficiency, or even resulting in the burn-out of the elements.

Electrically heated degreasers are also equipped with bottom safety thermostat and proper electric controls, either automatic or manual.

When steam heat is not available for a large degreasing installation, gas or electric heated steam generators are

generally used to furnish steam. They provide a very satisfactory and flexible heating means.

Protective Coating

Manufacturers of degreasing equipment are constantly fighting the problem of corrosion resulting from water or moisture being introduced by atmospheric condensation or mechanically carried in on the work. Up to the present, hot-dip galvanizing has proven to be the most satisfactory protective coating for the inside of degreasers. As this can only be applied in the small sizes, other coatings are used in large machines. The method of applying the coating considered most satisfactory on a commercial basis for this purpose is that known as metal spray. While it is a much discussed subject as to which sprayed metallic coating is the best zinc, tin, and tin alloys are the most commonly used.

The greatest difficulty with the sprayed coating is the preparation of the surface of the basis metal. The practice is to shot blast the surface with steel grit to properly clean it and give a "tooth" to hold the coating. However, the "human element" must be relied on, not only for the preparation of the surface, but also for applying the proper thickness of coating to eliminate porosity and possible peeling.

There have been many experiments performed with plastic coatings, but none of these, to date, has proved successful. One factor that works to their disadvantage is the insulating effect produced on the condenser. It is important to avoid a coating or lining that will reduce the efficiency of the cooling means.



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There's a GUSHER Coolant Pump of the proper type and the right size for every coolant need — and GUSHER Pumps stand up in the hardest kind of service.

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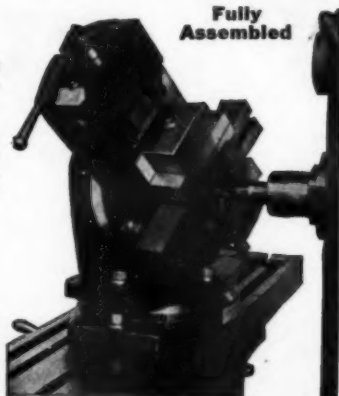
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WHAT'S NEW *in the industry*

by Wesley G. Paulson, Editor

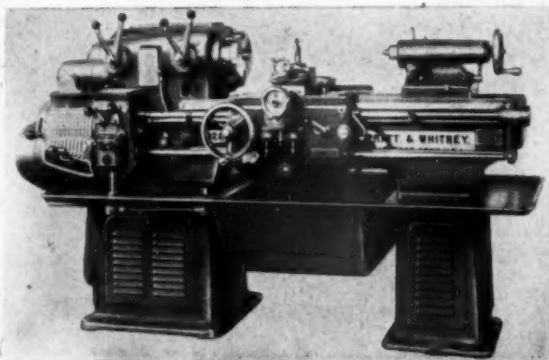
Model "C" 12-inch Pratt & Whitney

Pratt & Whitney, of Hartford, Conn., announces a new 12-inch Model "C" Lathe, to be a companion machine to the Model "C" 14 and 16-inch lathes already on the market. The new size, with an actual swing of 14½-inches over the bed, is available in two lengths: 30 and 54 inches between centers. It has 18 spindle speeds arranged in geometric progression up to 1500 r.p.m. Like the larger machines, the constant speed driving motor is mounted in a cabinet leg under the headstock. A fully enclosed triple V-belt drive carries power to the main driving pulley on the rear of the headstock. A three h.p., constant speed 1800 r.p.m., ball bearing motor, either A.C. or D.C. is used. Electrical controls are in a cabinet leg under the tailstock, while the motor push button control is mounted conveniently for the operator's left hand on the quick change gear box.

All headstock spindle gears are hardened and have ground teeth accurate to .0002-in. These precision

gears are relied upon for quiet accurate results, freedom from chatter and gear marks. Except for the pair of helical gears which transmit power from the drive shaft into the headstock, all gears in the spindle train are of the spur type and are ball bearing mounted. The spindle is mounted on three bearings. Two are preloaded precision ball bearings at the front end, 8¾-inches apart, forming a rigid support to the spindle driving gears. The third bearing is of the precision roller type and is mounted at the outer end of the spindle.

Power from the three-belt drive comes into the machine thru a Pullmore multiple disc double clutch. This clutch is controlled by either of two



levers, one at the front of the headstock and the other on the right side of the apron.

The rear of the headstock and the bed are built out to form what is called a "column headstock". This it is explained, insures solid support to the driving pulley, takes the pull of the driving belt and does away with excessive overhang. In addition, a larger surface area is obtained for the oil reservoir in the bed, so that the oil used for lubricating the spindle bearings and gears remains cool under continuous operation. A Cuno filter at the rear of the bed cleans the oil which is used over and over again. It is pumped in a continuous rain down over the entire gear train and is lead into the various ball bearings.

Power is taken from the headstock thru a set of ratio gears to the quick change gear box. The latter provides for 60 quick changes of feed ranging from .0025 to .152-inch. It also provides for 60 quick thread changes from 1 to 60 threads per inch inclusive. A direct reading index plate permits rapid

setting and checking of threads or feeds without recourse to tables or charts. At the left end of the gear box is a removable guard which covers a quadrant and change gear arrangement. This is for change gears for special threads or for translating gears when needed. Separate feed rod and lead screw are used, the one being at rest while the other is in use. This does away with any excessive wear on the precision lead screw. Drive selection for the one or the other is made with a small lever on the quick change gear box.

A synchronizing high speed clutch mechanism has been incorporated in the headstock for reversing the lead screw and feed rod drive. This makes it possible to reverse the carriage at higher speeds without stopping. The lever controlling this is on the right hand end of the apron and has a vertical movement with three positions.

The apron is so designed that the front may be removed to permit full accessibility to the interior mechanism

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without removing the apron from the lathe. The apron gears and worms all are mounted on ball bearings. An interlocking device prevents the half nuts from being engaged on the lead-screw unless the longitudinal feed clutch is fully disengaged, or vice versa. The feed clutches in the apron are of the positive type. Longitudinal feed is thru a rack and pinion with a large handwheel for manual operation. Transverse feed is thru a large diameter feed screw and has a large manual operation handwheel. The apron also carries the leadscrew nut lever, carriage reverse lever and a built-in thread chasing dial.

The carriage is mounted on one V and one flat way on the bed. It is gibbed front and back for accurate adjustment. The cross slide screw is supported in a ball thrust bearing, and has an easy hand action or "feel". The large micrometer dials are graduated to give work diameter reductions in thousandths of an inch. The cross slide stop for thread cutting is easy to use and operates in both directions, a distinct advantage when cutting either external or internal threads. The compound rest handwheel is set at an angle for knuckle clearance. The tool post capacity is $\frac{1}{2} \times 1$ -inch.

Oiling of the carriage, apron and cross slide is accomplished automatically by a small pump operated by the action of the clutch lever. This is in effect a one-shot system each time the operator starts the spindle. Oil is stored in a reservoir in the apron and is pumped to a pocket running the full length of the top of the apron. From this pocket oil is led thru metered out-

lets to the carriage, cross slide, ways on the bed and into all bearings and over all gears in the apron. The only thing necessary to insure complete positive oiling is to keep the reservoir in the apron full. A sight gage is provided for this purpose.

The new lathe weighs approximately 2700 lbs., net without motor or starter, while the 54-inch length weighs 3075 lbs. The width of both sizes is 31 $\frac{3}{4}$ -inches, and the overall lengths are 88 and 112-inches respectively.

A complete set of accessories is available for the Model "C" as extra equipment. These include expansion arbors and bushings, carriage spacing attachment, collets and collet rack, chucks, plain and multiple indexing face plates, radial, spiral and side relieving attachments, pump and piping equipment, steady rests, follow rests, plain and elevating tool rests, speed reducer, taper attachment, translating gears, and complete metric equipment.

Please address the makers for further information, and we'll appreciate mention of The BLUE BOOK.

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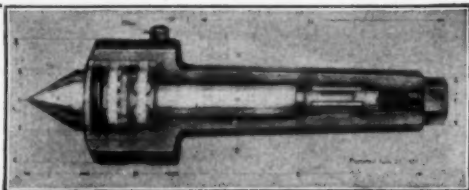
A new addition to the Hammond Machinery Builders of Kalamazoo line of Polishing and Buffing Equipment is a low-priced, lighter duty Type "R" Rite-Speed Polishing and Buffing Lathe which will accommodate motors up to and including 3 h.p., 60 cycle, A.C. or 2 h.p., 25 cycle, A.C.

The spindle is 45-inches long overall and operates on two ball bearings. It is driven by V-belts from the motor,

HEAVY DUTY LIVE CENTERS

Especially adapted for heavy work. Equipped with a combination of precision type ball and roller bearings to assure rigidity and maximum capacity for high speed production and longest possible service. Bearings can be renewed if necessary at slight cost.

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And with guaranteed accuracy.

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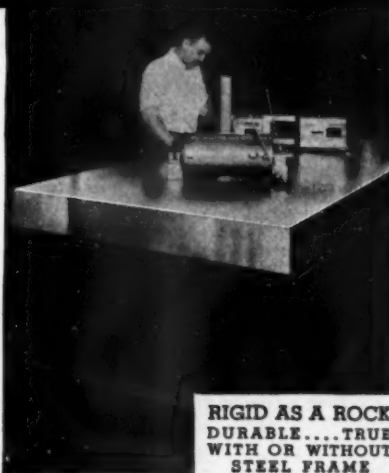
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Always absolutely true, the Challenge Semi-Steel Layout Surface Plate provides an ideal and durable base for accurate and profitable layout and assembly work. Doesn't dent or score. Never sags, for it is sturdily reinforced underneath with heavy ribs. Standard sizes: 12x18 to 48x96 inches. Special sizes made to order. The arc-welded frame equipped with numerous lock leveling screws is optional. Write for complete description and prices.



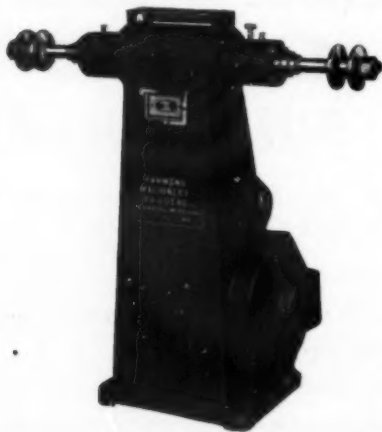
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**RIGID AS A ROCK
DURABLE....TRUE
WITH OR WITHOUT
STEEL FRAME**

which is mounted inside of the base.
Standard equipment includes push

and spindle lock to hold spindle when changing wheels.



This new lathe, weighing 475 lbs., will be of interest to shops doing light polishing or buffing. It will also interest shops in 25 cycle areas, as the V-belt drive gives efficient spindle speeds regardless of the speed of the motor.

For particulars write the Hammond Machinery Builders, Inc., 1614 Douglas Ave., Kalamazoo, Michigan.

Janette Motorized Speed Reducers

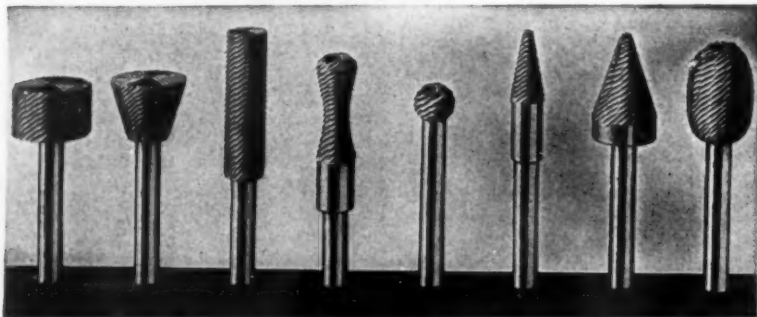
The Janette Manufacturing Co., 556 W. Monroe St., Chicago, has issued a new bulletin with pictures and descriptions of 10 types of speed reducers, varying in size from 1/50 to 7 1/2 h.p. Ask for Bulletin 22-7, and we'll appreciate mention of The BLUE BOOK.

button control with starter, having overload and low voltage protection

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High Speed Vertical Mill

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Swivel head graduated 90° both ways.

Movable quill with $\frac{3}{4}$ " travel. Mills 8x16" die at one setting. Six speeds—375 to 2820 r.p.m.

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Time and Money



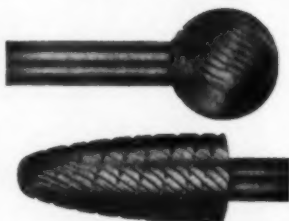
A Tree Collet Index Fixture will speed up grinding, milling and drilling operations.

Takes collets up to $\frac{1}{4}$ ". Index plate has 24 holes. Cuts cost in milling punches, teeth in shank cutters, small pinions, multiple flats, slots and keyways.

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Jarvis Rotary Files are ground from the solid with the head and shank in one piece. The various shaped blanks are machined, hardened and finally the teeth are ground into the solid, hardened blanks.

Grinding from the solid after hardening makes for harder and sharper teeth—the teeth are not dulled by heat treating).

Jarvis Rotary Files may be reground many times at a fraction of their original cost, (thus bringing the price of the file below the cheapest hand cut file).

Ask for new catalog MST etc.

The Chas. L. Jarvis Co.
Middletown, - - - Conn.

Accessible Controls in New Spring Coiler

The chief improvement in this new Sleeper & Hartley spring coiling machine is the ready accessibility of the



pitch and diameter controls. Heretofore these controls had to be adjusted—with uncertain results—by reaching inside the machine. The new machine features a control cabinet on the front, from which the cam controls are operated. The other controls made thus accessible are individual pressure for the feed rolls; adjustment for cutter alignment; micrometer adjustment of compound blocks; and the pitch-stop.

Full information on this machine may be had by writing Sleeper & Hartley, Worcester, Mass., mentioning **The BLUE BOOK**.

"Comet" Lamp-Socket Hoist

Designed to fill a need for handy hoisting equipment to be used where heavier equipment is impractical, the new CM "Comet" has just been announced by the Chisholm-Moore Hoist Corp., 234 Fremont Ave., Tonawanda,

N. Y. It is equipped with a specially built heavy-duty motor built to run on an ordinary light circuit or 3-phase power line.



The new hoist has ball bearings at all rotating points, with easily operated controls that afford a sensitive mechanism for moving loads fractions of an inch. The positive brake is easy to adjust. Provision has been made for limiting the travel of the load hook.

It is offered in four sizes: 250, 500, 750, and 1000 pounds. Several speeds are available. The 500-lb. size weighs 85 lbs. Full details may be had from the manufacturer.

Holden Adopts New Containers

Holden Light Case and Holden Hard Case, made by the A. F. Holden Co., of New Haven, Conn., now are furnished in improved 100-lb. containers which make the materials easier to remove and easier to use than before. The improved drums are shown in the illustration. With a smaller diameter, they will take up less room in the heat treating department. A larger closure facilitates removal of the contents.

JARVIS



FLEXIBLE SHAFTS AND MACHINES

"Single and multiple speed flexible shaft units from 1750 to 18,000 RPM in various horsepower ratings."

Please write for our new catalog MST etc.

THE CHARLES L. JARVIS CO.
MIDDLETOWN, CONN.

Ex-Cell-O Introduces "Retracting" Spindle

A new precision boring spindle which retracts the tool from contact with the work on the return stroke has been developed by Ex-Cell-O Corp., 1188 Oakman Blvd., Detroit, Mich. Designed for precision boring operations where extreme surface finish is desired the new spindle is automatic in operation, through the provision of limit switches and an electric relay.

The spindle is designed to the same installation dimensions as standard boring spindles, so that it may be interchangeably installed on boring machines already equipped with other types of spindles.

The retracting action is obtained through a simple mechanism. The spindle proper is made with a shaft sliding endwise within the hollow spindle. On the end of the spindle is located a tool carrying quill, free to move at right angles to the spindle axis, in the plane of the cutting tool axis. Within the quill are machined two opposed hollow tapers, one concentric with the lengthwise axis of the quill, the other machined a small amount off-center.

At the machine end of spindle, a hydraulic cylinder is bolted to the

spindle flange. The function of this hydraulic cylinder is to move the central shaft endwise a small amount in the spindle. When the hydraulic cylinder and piston pull the shaft back through the spindle, a tapered portion on the quill end of the shaft engages the rear taper in the quill. This is effective in centralizing the quill on the same axis with the spindle, and locking the two in cutting position. When the hydraulic cylinder pushes the shaft forward through the spindle, the shaft leaves the taper and engages the reverse off-center taper toward the front of the quill. This engaging action results in moving the quill off-center at right angles to the spindle axis, retracting the tool from the work.



"Buy Economy — You'll Effect Economy"



**SOCKET HEAD
CAP SCREWS**

*Milled
from Bar*



**HOLLOW
SET SCREWS**



*Made of
Alloy Steel*

**ECONOMY MACHINE PRODUCTS CO.
5207 LAWRENCE AVE. CHICAGO, ILL.**

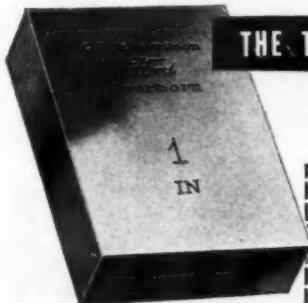
JOHANSSON BLOCKS are manufactured in three degrees of accuracy: 1, to within $\pm .000008$ of an inch; 2, $\pm .000004$; 3, $\pm .000002$.

They are sold separately or in sets. Every block in every set falls

well within the advertised limit of accuracy.

Catalog No. 12 contains full information including the low Johansson prices. Mail coupon for a copy to keep on hand at all times.

JOHANSSON GAGE BLOCKS



THE THIRD DEGREE IS $\pm .000002$ INCH!

ACCURATE TO WITHIN $\pm .000008$\$6

ACCURATE TO WITHIN $\pm .000004$\$8

ACCURATE TO WITHIN $\pm .000002$\$36

FORD MOTOR COMPANY (Johansson Division)
Dept. C, Dearborn, Michigan

Please send me free copy of Catalog No. 12.

Name

Address

City State

The Challenge Abrasive Cut-Off Machine



**CUTS ANY METAL
HARD OR SOFT**

Handles tubular or solid metals soft or hard—even cuts hardened tool steel. Capacity up to one inch in thickness. No expensive blades to break. Write for full data and prices—today!

THE CHALLENGE MACHINERY COMPANY

CHICAGO

GRAND HAVEN, MICHIGAN

NEW YORK

In operation, the starting of the machine feed also actuates the hydraulic cylinder, pulling the shaft back and moving the tool into cutting position. At the end of the cutting stroke, reversal of the machine feed also reverses pressure in the hydraulic cylinder to move the cutting tool out of the way during the return stroke.

Postel Filing Machine

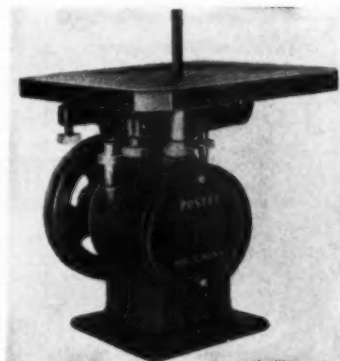
A new die filing machine, small and compact, has been placed on the market by the Postel Filing Machine Co., 915 Washington Ave., So., Minneapolis, Minn.

The machine can be belt-driven by any $\frac{1}{4}$ horse-power motor. Evidently it uses little bench room, the adjustable table being eight inches square. The stroke of the file is $1\frac{1}{4}$ -inch and the reciprocating vise will hold any standard $\frac{1}{4}$ -inch round shank file, the coarsest obtainable being recommended by the manufacturer.

Reasonably priced and ruggedly built, this machine should be of great use on the bench of any toolmaker or

diemaker.

In writing for further details, please mention The BLUE BOOK.

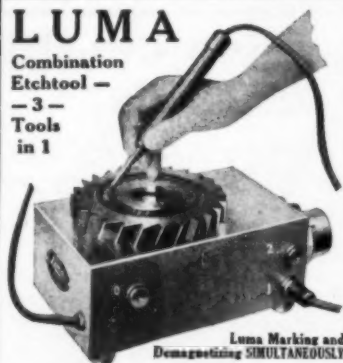


Thread Grinding

A new booklet, "When, Why and How to Grind Threads," has been

LUMA

Combination
Etchtool —
— 3 —
Tools
in 1



Luma Marking and
Demagnetizing SIMULTANEOUSLY

Writes on hardened steel — demagnetizes at the same time—with carbon point does light spot annealing and soldering jobs. Compact—easy to use—dependable.

Send for details—5-day FREE TRIAL OFFER!

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300 ROOMS
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\$2, \$2.50 and \$3.00

H. F. MOORE, Manager

E. Sixth St., and St. Clair Ave.
Opposite New Civic Auditorium

Newest in Downtown
CLEVELAND

issued by the Detroit Tap and Tool Co., 8432 Butler, Detroit, Mich. It contains interesting and instructive information on this company's thread-grinding service and will be sent to interested persons. In writing, please mention The BLUE BOOK.

Kennametal In England

McKenna Metals Co., 135 Lloyd Ave., Latrobe, Pa., manufacturers of Kennametal tools and blanks for steel and

metal cutting, has licensed George H. Alexander Machinery Ltd., 82 Coleshill St., Birmingham, England, to sell Kennametal and fabricate tools from Kennametal in Great Britain and all British possessions, exclusive of Canada, according to announcement by Philip M. McKenna. Kennametal, essentially a tungsten titanium carbide compound, is an ingredient used in the manufacture of hard carbide alloys for steel tools, which are said to be harder than any tool steel.

SCHMIDT "Hi-Duty" Pneumatic MARKING MACHINE



MODEL 25

ADVANCED BUSINESS METHODS demand improved records of metal fabrications. This machine makes marking operations quick and simple. Part numbers—order numbers—manufacturer's name and other important data marked on your products will mean permanent records, to last the life of the part, and REPEAT ORDERS, a vital part of any business.

The Schmidt Model 25, illustrated at left, is a light, general purpose hand marking machine, with a supplementary air cylinder to take the place of the foot pedal in raising the work to the lettering tool. Air from the shop line is used, and the four-way foot Valve assures fast operation. This machine uses solid flat or round dies as well as the adjustable type, in a flat or knurl type holder. The use of the air cylinder, by reducing operator fatigue, greatly increases production on continuous marking operations.

GOOD ADVERTISING At Low Cost

Make your products SPEAK for themselves——

——Tell your name and part number for new and repeat orders.

IF IT'S WORTH MAKING, IT'S WORTH MARKING.

IF IT'S WORTH MARKING — MARK IT WELL.

Send for complete catalog of our full line of marking Tools, Machinery and Equipment.

GEO. T. SCHMIDT, Inc.

1802 Belle Plaine Ave., Chicago, Ill.
Builders of Marking Equipment Since 1895.

Lewis Shape Straightening and Cutting Machine

A new addition to the "Travel-Cut" line of wire straightening and cutting machines is announced by the Lewis Machine Co., 3441 E. 76 St., Cleveland, Ohio.

The new model, known as the Lewis No. 20-F Travel-Cut Shape Straightening and Cutting Machine, is equipped with a flying shear type cut-off and is designed to handle square, flat, hexagon and shaped rod. It has a capacity of $\frac{3}{8}$ -inch square or equivalent area and will take flats up to $2\frac{1}{2}$ -inches wide. A simple adjustment of the gauge permits the cutting of any length required up to the maximum cutting length of the machine.

The rod is taken from the coil, run through the three-roll preliminary flat straightener which removes the coil bow, passes through the two horizontal feed rolls and six edge straightener rolls which straightens the rod edge-ways; through the six flat straightener rolls where the flat straightening is completed, and comes out the two vertical rolls perfectly straight. It is then guided through the cut-off head and on into the guide bar where it trips the clutch by striking the gauge wire that has been set for a pre-determined length. After tripping the clutch, the rod moves forward to the positive

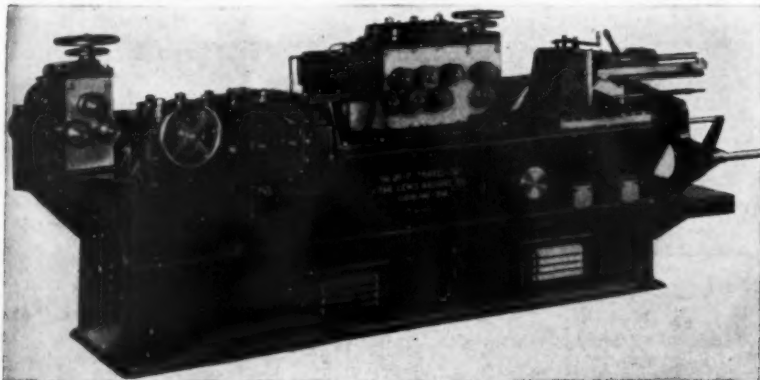
length gauge traveling with the cut-off head where it is accurately gauged to length before being cut. The cut-off head, traveling with the rod, cuts while in motion and produces rods free of roll marks.

The machine is substantially built and offers these advanced features:

- (1) Anti-friction bearings throughout (a total of 88 being used).
- (2) All rolls power-driven.
- (3) Alloy steel heat-treated drive gears fully enclosed in oil housings.
- (4) All main drive units including flywheel, clutch and cut-off mechanism fully enclosed in oil-tight housings.
- (5) Forced feed lubrication to cut-off headways.
- (6) Centrally located oil tank and pump which oils the preliminary roll straightener, horizontal straightener and vertical straightener housings.
- (7) Silent multiple V-belt drive direct from 30 h.p., motor mounted in closed steel base.

The company also manufactures a complete line of wire straightening and cutting machines for round wire from $\frac{1}{8}$ to $\frac{3}{4}$ -in. diameter.

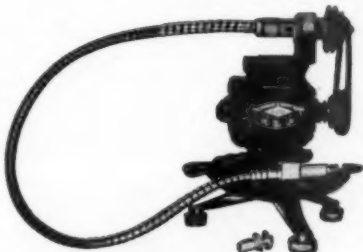
In writing for additional information, please mention The BLUE BOOK.





Model 00B
2500—5000—
11,000 r. p. m.
Combination Type
for Bench or
Ceiling Mounting.

PRICE \$65.00
Complete with
 $\frac{1}{4}$ " Collet.



Floor models with $\frac{1}{4}$, $\frac{1}{3}$ or $\frac{1}{2}$ h. p. Motors.¹
Six Types, giving a wide choice
of speed ranges—900 to 7200
r. p. m. Prices from \$60 to \$89.50.

The complete WYCO Line includes precision-built flexible shaft equipment for every industrial need—engineered for dependability, efficient operation and trouble-free performance over long periods. Write TODAY for a copy of the complete WYCO catalog giving illustrations of the different models and full specifications.

COMPARE PRICES . . .
WE GUARANTEE QUALITY!

Your Dealer sells the WYCO Line.



WYCO

Precision-Built **TOOL ROOM GRINDERS**

**A Type . . . A Size For Every
Purpose and Purse**

Bench Types with
 $\frac{1}{4}$ or $\frac{1}{3}$ h. p. Motor.
Four Models,

Priced at
\$55.00 to \$77.00
complete with
wheel arbor and
chuck.

WYZENBEEK & STAFF, INC.

838 W. HUBBARD ST.,

CHICAGO, ILL.

Steinel Pivot Burnishing Machine

The George Scherr Co., 128 La Fayette Street, New York is marketing a new Pivot Burnishing Machine embodying several improvements.

The machine is used to burnish shafts and pivots of small pinions to uniform diameter, true roundness and to smooth the bearing surfaces to a high degree of precision and finish. It is equipped with micrometer adjustment for control of diameter. It may be operated by unskilled help and the manufacturer claims it saves 3 to 5 times the time formerly required on hand work.

Among the improvements is a new rack and pinion lever for feeding the work. The burnishing wheel bearing is long, giving extra support; the foot treadle at the head of the machine gives ease of operation; belt and pulley are enclosed under a guard eliminating accumulation of dust and other foreign matter in the mechanism.

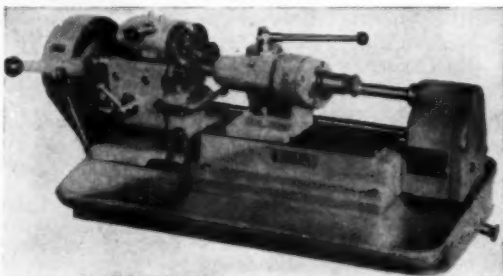
The machine is stated to eliminate hand work and make it unnecessary for plants to develop special equipment to burnish parts. It is intended to finish bearings, pivots and other articles produced on automatics to a tolerance of .0004". Thus, the parts do not have to be held so closely on the

automatics, but may be finished to the finer tolerance on the burnishing machine.

The output of the machine depends on the hardness and amount of material to be removed. In taking off .001" to .002" of material it is said that 600-900 shafts per hour may be produced with an accuracy of .0004". A letter to the George Scherr Co., mentioning The BLUE BOOK, will bring full details.

Novel Colloidal Graphite Application

A new method of lubricating the moving parts of such delicately adjusted mechanisms as orifice type flowmeters seems to hold promise in fields where "permanent" type lubrication must be combined with pressure sealing, fluid proofing, and temperature-resisting properties.



The new lubricant was developed as a result of tests to find a lubricant for the divisional shafts and adjacent

Wire-Working Machinery
Wire Mill Equipment

Sleeper & Hartley, Inc.
Designers and Builders
Worcester, Massachusetts

"Shock- Proof"

means
**SUSTAINED
ACCURACY**



The new STANDARD Dial Indicators are "Shockproof"—immune to shocks which impair the accuracy of other indicators. The precision gaging mechanism of STANDARD Dial Indicators is isolated from shocks, jolts and jars. Thus STANDARD accuracy is sustained over longer periods and these gages set new standards for duration and degree of accurate service.

Standard Dial Indicators are available in many types and models for every dial gaging need. Catalog No. 7 covers the complete STANDARD Line of precision gaging equipment. May we send you a copy?

For Accurate Gaging Come To "Standard"

Write for copy of new illustrated bulletin.

STANDARD GAGE CO., INC.
POUGHKEEPSIE, NEW YORK

lapped parts (bearings) of a meter measuring gas containing 650-675 grains of hydrogen-sulphide per 100 cubic feet, under pressures up to 50 lbs. per sq. in.

Any gas leakage, of course, would cause rapid corrosion of the static spring, resulting in meter-failure, while gumming of the lubricant by the hydrogen sulphide would retard the meter action, destroying its accuracy.

After a series of studies and tests it was found that a colloidal dispersion of colloidal graphite in pure castor oil met the requirements—providing a sealing action without mechanical pressure means—and without increasing the carrier viscosity.

The castor oil dispersion of colloidal graphite, it is understood from Acheson Colloids Corporation, Port Huron, Mich., may be in turn dispersed also in light greases or blended with low freezing point fluids, to meet either high or low temperature lubrication requirements.

In writing for further information, please mention The BLUE BOOK.

SAVE 25% ON GRINDING WHEEL DRESSER COST

Loaded from base to peak with tough-scaled, virgin diamond particles, the Carboley diamond dresser is a gluten for work and a miser on costs. For rough, semi-finish and finish dressing all types of grinding wheels.

Send for free dresser catalog DR-38.



CARBOLEY CO., INC.
2983 E. Jefferson, Detroit, Mich.
Chicago • Cleveland • Newark
Philadelphia • Pittsburgh
Stamford, Conn. • Worcester, Mass.

Catalog
DR-38

• CARBOLEY •
DIAMOND IMPREGNATED WHEEL DRESSERS

New Colonial Alloy

A new non-ferrous alloy, Colalloy, is now being manufactured by the Colonial Alloys Co., Colonial Philadelphia Bldg., Philadelphia, Pa. It is silvery in color, lighter than steel, and corrosion-resisting. The manufacturer supplies the new alloy in all the common shapes and sizes.

According to the makers, the alloy possesses many desirable physical and chemical properties. It is said to be workable and rust-proof. Testing samples and technical information will be furnished to readers of The BLUE BOOK upon application to the company.

Center Lapping Machine Bulletin

A new bulletin 10782 of the Ex-Cell-O Corporation, 1188 Oakman Blvd., Detroit, describing a new center lapping machine designed to shape more accurate centers for lathe and grinding work, is now available.



STANDARDIZED

Machined Steel **DIE SETS** Semi-Steel

Drop Forged Steel

Headquarters for Standardized Die Sets, embodying many exclusive features and embracing more than 185,000 stock sizes and 46 different styles. A die service that is unsurpassed. Let us prove it!

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E. A. BAUMBACH MFG. CO.
1810 So. Kilbourne Ave., CHICAGO, ILL.

NICHOLSON CONTROL VALVES

are made in two, three and four-way types for air, oil, water, steam, gas, etc., pressures to 5000 lbs. Style E is a general purpose valve for pressures to

300 lbs. Various metal combinations to suit any medium. Style J is for air and oil only, pressures to 125 lbs. Style H is a balanced hydraulic valve for pressures to 5000 lbs. We also manufacture foot, solenoid and motor-operated valves.



Style J



Style E



Style H

Bulletins on request.

OTHER NICHOLSON PRODUCTS: Mandrels, Arbor Presses, Flexible Couplings, Steel and Stainless Steel Floats, Steam Separators, Steam Traps, Air Separators, Air Traps, Air Vents, Etc.

W. H. Nicholson & Company

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DRILL CHUCKS

With Hardened Steel Jaws

Capacity 0 to 1/2" fitted with No. 1 or No. 2 Morse taper shank **\$1.25** each

No. 1 or No. 2 Morse taper shanks with 1/2" x 24 thread **73c** each

Chucks without shanks **52c** each

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MICHIGAN

BEST VALUES ON THE MARKET

"Pattern Making"

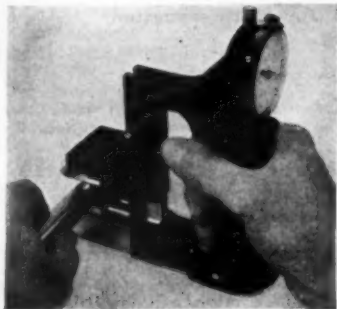
In the past few years the art of pattern making has expanded wonderfully, just as other branches of our mechanical industries have developed, for the work of the pattern maker is the first step in the manufacture of many new machines. To keep pace with this progress, the American Technical Society, Drexel Ave. at 58th St., Chicago, has revised and republished its excellent book, "Pattern Making," by James Ritchey, formerly of Armour

Institute of Technology. The price is \$2.00. The revisers are Walter W. Monroe, of Worcester Polytechnic Institute; Charles Wm. Beese, of the Armstrong Cork Co., and Philip Ray Hall, of Pennsylvania State College. All of these men are not only practical experts in pattern making but have also had teaching experience which makes itself evident in the readability and the logical form of the book.

Of particular interest to the readers of The BLUE BOOK will be the 76-

page section on the making of metal patterns. This specialized field of pattern making has been thoroughly covered by the revisers.

The book has been written in an easy to understand, "how-to-do-it" manner, with the steps and problems encountered in pattern making carefully and concisely outlined. 233 pages in length, it contains 350 illustrations of tools, work, machines, and castings. We feel that the pattern maker who wishes to keep up with his trade, the designer who wants to know more about shop methods, and any others interested in the various phases of foundry work will find "Pattern Making" invaluable.



A Snap Gauge that Shows you the Size

You see the exact size directly with this snap gauge. Upper jaw is adjustable. Back stop self-centering, and adjustable. Jaws have Tungsten Carbide inserts. 2½" maximum opening. Send for catalog.

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FEDERAL PRODUCTS CORP.

1144 Eddy St.,

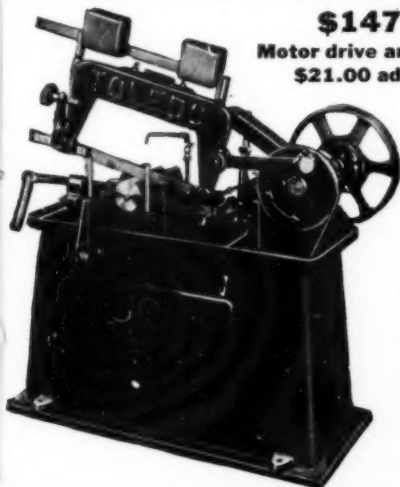
Providence, R. I., U. S. A.

BEST VALUES ON THE MARKET

L-W HIGH SPEED 6x6 POWER SAW

\$147.50

Motor drive arrangement
\$21.00 additional



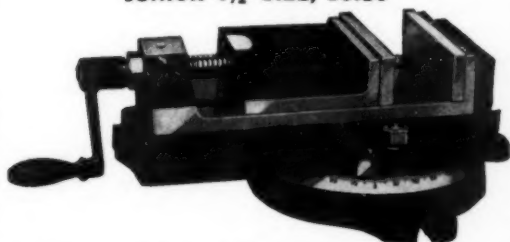
*A Real Saw
That Will
Save You
Time And
Money*

Designed for economy and efficient performance, this saw is rigid and dependable. Automatic trip stops operation at completion of cut. Automatic relief of the saw blade on the non-cutting stroke is also provided. Coolant pump is mounted inside base to make a clean and compact assembly. Capacity is 6"x6" with 14" blade.

SWIVEL MILLING MACHINE VISES

MASTER 85 LB. 6½" SIZE HEAVY DUTY \$27.00

JUNIOR 4½" SIZE, 19.50



These large semi-steel vises may be used plain or swivel and are suitable for milling machines, drill presses, shapers, etc. Sturdy steel jaws. Key slots provide for attaching to machine table holding surface, with jaws at right angles or parallel to table. 6½" size weighs 85 lbs. 4½" size weighs 45 lbs.

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HANDEE

TOOL OF 1001 USES



Are time-stealing hand operations cutting in versatility, speed and power help solve your

Portable

Plug in any electric outlet and set up shop on the spot.

Compact

It goes where larger tools can't; makes many repairs right on machines without dismantling and avoiding costly shut-downs.

Fast

Develops 25,000 r.p.m.—plenty of speed for every kind of work.

Light Weight

Can be used all day without causing fatigue. Weighs only 12 oz.

Sturdy

Stands the hard knocks of industrial usage.

UNLIMITED APPLICATION

The Handee does work on all metals, plastics, alloys, wood, stone, bone, etc. 300 instantly interchangeable accessories make it actually a mobile toolshop, quickly carried from job to job and easily operated with one hand.

Widespread Use

Every day more metal working shops, factories, tool rooms and experimental laboratories are taking advantage of the Handee, endorsed by engineering and efficiency authorities all over the world as the most economical time-saving tool made.



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Quality Products
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BETTER WORK -IN LESS TIME

Putting into your profits? Then, let Handee
solve your production problems.

A Real Precision Tool

The Handee is built UP to highest quality standards rather than down to a price, and contains its own custom-built precision motor.

New 64-Page Catalog

Complete information on all Handee Products, including the largest assortment of accessories ever presented—one to fit every special job.

There Are More Handees in Use Today Than All Other Similar Tools Combined.

Good Hardware Dealers and Mill Supply Houses Everywhere Carry and Recommend the Handee. Order through them or direct on 10-Days Trial.

Grinds Sands
Drills Saws
Polishes Sharpens
Cuts Engraves
Routs Cleans
Carves Etc.

This
Picture
is
Actual
Size

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Model

\$1850

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6 Accessories Free

POWER MOVEMENT IN ANY DIRECTION



HANNA Cylinders may be mounted vertically, horizontally or in any other position and deliver the same powerful, smooth, positive thrust or pull motion.



Select an operation in your plant involving a pushing, pulling, lifting or lowering motion and compare cost of doing it with a Hanna Cylinder.



TO LEARN PRICE OF CYLINDER SPECIFY FOLLOWING:

1. Cylinder diameter or force required.
2. Length of stroke.
3. How cylinder is to be mounted.

PUSH—PULL—LIFT—WITH HANNA CYLINDERS

HANNA ENGINEERING WORKS

1763 ELSTON AVENUE

CHICAGO, ILLINOIS

Landis Style LBSR Expanding Chaser Collapsible Tap

A new expanding chaser collapsible tap is announced by the Landis Machine Co., Inc., of Waynesboro, Pa. It is designed for the boring and tapping of tapered holes which must be tapped from the small to the large diameter.

As shown by the illustration, a boring and tapping head are mounted in tandem on the tap body to enable the operator to bore and tap the hole in one pass of the tool.

The design of the tool permits using several sizes of tap heads on one tap body. The illustration shows an 8-inch head mounted on the tap body and additional heads of 4 and 6-inch diameters. Two sizes of bodies are available, one carrying heads of from 3 to 5 inches and the other the larger sizes to 12 inches.

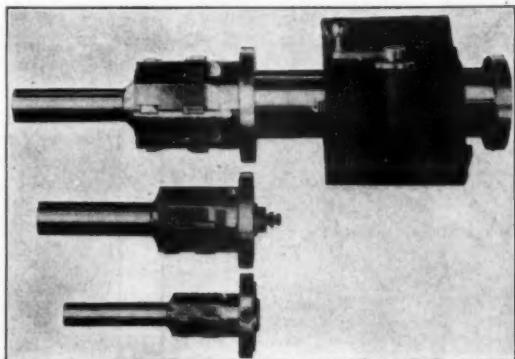
The advantages claimed by the manufacturer are ease of operation, durability, and exceptional versatility.

In writing for descriptive bulletin giving full information, please mention **The BLUE BOOK.**

Flexible Metal Hose and Tubing In Industry

The Flexible Metal Hose and Tub-

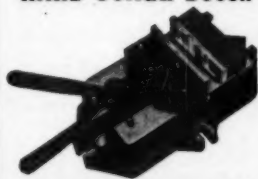
ing Institute, 150 Broadway, N. Y., announces publication of a new booklet entitled "The Fact Book of Flexible Metal Hose and Tubing" which, for the first time is said to present a complete factual story of these important products while graphically portraying their almost unlimited usefulness in meeting many of industry's difficult design, construction and maintenance problems.



Profusely illustrated with photographs of actual uses and installations, this booklet also lists and illustrates principal types and forms of Flexible Metal Hose and Tubing for the information of design engineers and users. It explains the thoroughly proved underlying engineering principles which have made possible the development of Flexible Metal Hose and Tubing.

This booklet should prove interesting

HARD USAGE Doesn't Phase The HARTFORD MILLING VISE



We also Build Machinery on a Contract Basis, Design and Develop Special Automatic Machinery—Gears and Gears Out to Order.

Because it was designed to "take it"—and it does! It will stand up, day after day, under the heaviest, toughest strain of production milling work. Made of the best materials, with all parts interchangeable, it will outlast four or five ordinary vices. Rapid and accurate in operation—the top eccentric handle gives tremendous binding force, while the lower cam-faced handle gives instantaneous quick-opening and return. A trial in your shop will convince you better than anything we might say.

Write for Folder and Complete Details

Jaw width.....	5"	Maximum opening	3½"
Jaw depth.....	1½"	Weight.....	40 lbs.

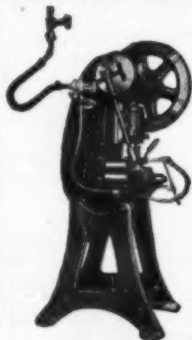
Also made in the swivel-jaw type with hard or soft jaws, maximum opening 2¼".

HARTFORD SPECIAL MCHY. CO.
285 HOMESTEAD AVE., HARTFORD, CONN.

to every plant executive who uses hose and tubing in his maintenance work, to all industrial executives whose manufacturing production or distribution problems involve the handling of steam, gases, hot or cold liquids and certain solid or semi-solid materials, and also to design engineers who will find many opportunities for further product development in the unique combination of characteristics that flexible metal hose and tubing possess.

In writing we'll appreciate mention of The BLUE BOOK.

LITTELL Air-Blast Valve for Faster Safer Production



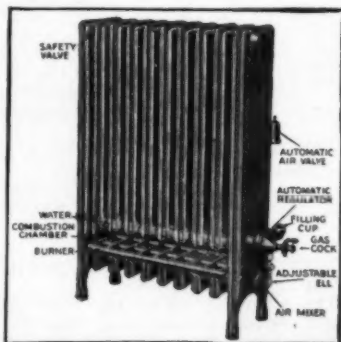
PAYS its cost in a few weeks time in — increased production — greater safety — economy of air. Automatically ejects pieces. Operator's hands are never in danger zone. Quickly adjustable air nozzle.

Automatic Roll Feeds—
dial feeds, magazine feeds, hopper feeds, for punch presses. Reels for coiled stock. Send for Circulars.

F. J. Littell Machine Co.
4153 RAVENSWOOD AVE., CHICAGO, ILL.

Automatic Gas-Steam Radiator

The Automatic Gas Steam Radiator Co., 448 Brushton Ave., Pittsburgh, Pa., announces a new gas steam radiator, available in both vented and unvented types, which operates automatically without boiler, water pipes, etc. Constructed of cast iron and practically indestructible, this new radiator serves as an ideal heater for offices, rooms, small shops, when and where it is not desirable or practical to operate big boilers.



"Automatics" are furnished in several different sizes. The manufacturer will be pleased to send complete information on request. Ask for Folder No. 541, and we'll appreciate mention of The BLUE BOOK.

PLUNKET IMPROVED VISES

Made Right—Work Right—Give Satisfaction

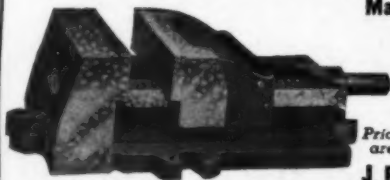
Drill Press Vise

With Extra Lugs for Bolting Down

No. 1—6" jaws, $1\frac{1}{4}$ " deep, opens 5", wt. 35 lbs. \$22.40
No. 2—10" jaws, $2\frac{1}{4}$ " deep, opens 8 $\frac{1}{2}$ ", wt. 80 lbs. 34.20

Prices are net f. o. b. Chicago. Dealers' inquiries are solicited. Write for illustrated folder today.

J. E. Plunket Machine Co., 1223 W. LAKE ST., CHICAGO ILL.



"If it's a Spot Welder, we make it"—from a filament .0005" to a door welding.

We manufacture the most complete line of standard and special electric spot welders from $\frac{1}{4}$ to 500 K. V. A., some as low as \$25.00.

We also manufacture special welding transformers to suit your requirements.

Ask for our catalog No. 38W showing over 1250 interesting illustrations — press type air operated, plunger type foot operated and motor driven welders.

Send us your welding problems for quotations.

We manufacture a very complete line of welding tips and water-cooled electrode holders for difficult welding jobs.

We also do Job Spot Welding.

EISLER ENGINEERING COMPANY, Inc.

762 So. 13th St., Near Avon Ave.,
Newark, New Jersey

EISLER SPOT WELDING

FOR STRONG
ACCURATE-
COMPACT
AIRCRAFT
WORK

The advertisement features a central illustration of an airplane in flight, surrounded by various types of spot welding machines and components. The machines are shown in different sizes and configurations, some with foot-operated levers and others with manual handles. The background is a light gray, and the overall tone is industrial and technical.

LIGHT ?

**CHICAGO
"ADJUSTABLE"
SHOP-SPOT-LIGHT**

Places Light Where Light is Needed

MODELS FOR OFFICE,
FACTORY, DRAFTING
ROOMS, ETC.

Catalog furnished on request

CHICAGO DIE CASTING MFG. CO.
2502 W. Monroe Street, Chicago, Illinois

The advertisement features a large, stylized illustration of a hand holding a long, adjustable arm that ends in a light fixture. The arm is composed of several segments connected by joints, allowing it to be positioned in various directions. The background is dark, and the light fixture is illuminated, creating a strong contrast. The text is arranged in a clean, modern layout, with the company name and address at the bottom.

**Scribed Lines
"STAND OUT"
When You Use
SUPREME
LAY-OUT
DYE**



They're easy to see—easy to follow because they have a pronounced contrast against the dark background.

With SUPREME Lay-Out Dye it isn't necessary to polish—simply clean the surface and apply the Dye with a soft cloth or brush. It dries instantly. Excellent for wet machining operations.

Special Offer—

Send 40 cents for a 5-ounce combination brush-in-can container for shop use.

Quart containers .90 Gallon containers 2.50

MICHIGAN CHROME COMPANY

6340 E. Jefferson Ave., Detroit, Mich.



RED HEAD

ETCHERS and DEMAGNETIZERS

Let us tell you the many advantages of our new D. C. and A. C. models now available. Also, see our new line of Magnetic Parallels and Midget Chucks.

Send **TODAY** for latest circulars

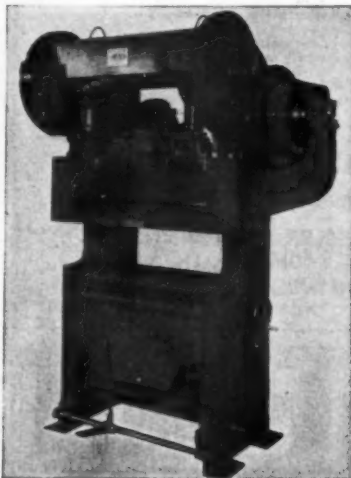
PRINTZ ELECTRIC CO.

14595 KENTUCKY AVE.,
DETROIT, MICHIGAN

**A New Brake By
Dreis & Krump**

Dreis & Krump Mfg. Co., 7440 Loomis Blvd., Chicago, announces a new type of special Press Brake.

This machine has been developed and built for turning in flanges on drawn sections, such as used in stoves, refrigerators, and other types of sheet metal cabinets.



The machine is an adaptation of the regular Press Brake for work formerly done on horn presses or on presses with off center die shoes. On this press all work is done on center of ram pressure. The off center load is taken by the bed which is widened at the bottom and heavily guided.

The bed on this machine is adjustable front to back thru worm and worm wheel arrangement. Dies are hung on front of bed.

The machine can be used as a regular press brake having all the standard features of a press brake as well.

The machine illustrated is of 70-tons capacity, with 4-inch stroke, 4-inch adjustment, 12-inch die space above bed.

ERRINGTON MULTIPLE HEADS



**Super-Sensitive
Fixed-Center
Drilling Heads**

**ADJUSTABLE
MULTIPLE SPINDLE
DRILLING HEADS**

**Stapleton,
Staten
Island,
N. Y.**



**Fixed-Center
Auto-Reverse
Multiple
Tapping Heads**



**All Parts Fully Enclosed
to Insure Pressure lu-
brication.**

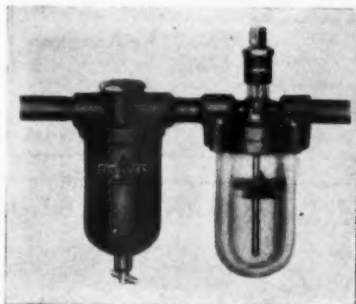
This machine is smooth operating, being twin-driven, double back geared, with friction clutch. Oiling is automatic and the adjustment of ram is obtained with individual motor. Any specifications can be changed to suit customer's individual requirements. Heavier presses can be obtained with the same construction.

A Strainer and a Lubricator By Norgren

Two new devices, an Air Strainer and an Air Line Lubricator, are now offered by C. A. Norgren Co., Denver, Colo.

The strainer comprises a double screen, a bronze head, and a drawn steel, tin-dipped bowl. A 200-mesh Monel metal screen is supported by a 100-mesh brass screen. Effective straining area is five times greater than inlet and outlet openings. There is said to be no restriction of air flow, no noticeable pressure drop. Screen element is easily removed for cleaning by unscrewing the top. Sump may be blown out by turning T-handle valve at the

bottom. The strainer removes dirt, scale and other impurities from the air stream and traps approximately 92% of the moisture. This new model is offered in $\frac{1}{4}$ and $\frac{3}{8}$ -inch sizes.



The new lubricator follows in general the design of the regular Norgren lubricators, with the added feature of a transparent oil reservoir of resilient plastic which, it is claimed, will not chip, stain nor shatter. Withstands the

500-lb. burst test and is suitable for installations in temperatures up to 180 deg. The transparent bowl allows the oiler at all times to check the reserve supply of lubricant.

Oil feed is controlled by a simply adjusted needle valve which is also in plain sight, revealing the exact amount of lubricant being introduced to the air stream. Adjustment is tamper-proof, preventing regulation by unauthorized persons.

A filler plug in the reservoir top

makes refilling easy. Even with the air line in use, it is stated that new lubricant may be added without any blow-back or spray. The new design of lubricator is now available in $\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{2}$ -inch sizes, for horizontal lines.

In writing for additional information, please mention The BLUE BOOK.

Lovejoy Safety Flexible Coupling

A new flexible coupling for handling misalignment, starting torque, absorbing shocks, etc. on direct connected machinery which the manufacturer says will provide increased safety and lower maintenance is announced by the Lovejoy Flexible Coupling Co., 5026 W. Lake St., Chicago.

Recent investigations of operating conditions in certain industries where explosive and inflammable gases, vapors and liquids are handled, suggest that flexible couplings with iron or steel bodies may not be entirely safe because of the possibility of a spark being created by some accidental contact with the iron or steel coupling. The body of the new L-R flexible coupling is made of Tobin bronze, which it is claimed will not "spark" under any conditions. The spider or resilient load cushion is of rubber, duck, leather or a brake lining material of woven asbestos.

L-R Type I-A "Safety" Couplings are made in the standard sizes with bores from 1 to 2 $\frac{1}{4}$ -inches inclusive. (2 h.p. to 90 h.p. at 1750 r.p.m.) Further information engineering data and literature on this coupling may be had from the manufacturers.

LET US QUOTE...



Our new modern plant is fully equipped with special machinery for

**COMMERCIAL JIG BORING,
DESIGNING AND BUILDING
of
DIES, JIGS AND FIXTURES
LARGE OR SMALL**

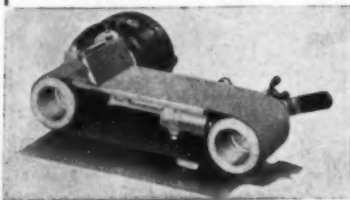
We can handle your Jig Boring jobs at reasonable prices on our new 18"x36" Pratt & Whitney Jig Borer. Quick service.

Have been delivering satisfaction since 1929—let us serve you.

QUALITY TOOL & DIE CO.

Ray W. Rice, Manager,
401 N. Noble St., Indianapolis, Ind.

AN INEXPENSIVE ABRASIVE BAND GRINDER



"Built Like A Machine Tool"

The Hormel-M Grinder is sturdily built with a supporting leg under the grinding table to eliminate vibration and tipping due to pressure on belt. Ball bearing throughout, equipped with Alemite lubrication, complete with grease gun.

Write for illustrated folder on this and other styles and sizes.

WALLS SALES CORP.

96 Warren St., New York, N. Y.

1905 *Strand* 1939

FLEXIBLE SHAFTS AND MACHINES

VERTICAL AND HORIZONTAL TYPES $\frac{1}{8}$ —TO 3 H. P. CAPACITIES

TYPE M7A $1\frac{1}{2}$ H. P.TYPE M10 $\frac{1}{2}$ H. P.TYPE M14 $\frac{1}{4}$ H. P.

**BUY
FLEXIBLE
SHAFTS
THAT ARE
MADE RIGHT
IT PAYS**

N. A. STRAND AND COMPANY

EXCLUSIVE MANUFACTURERS

FLEXIBLE SHAFTS - MACHINES AND ATTACHMENTS

5001-5009 N. WOLCOTT AVE.

CHICAGO

AUTOMATIC—

**Also More Accurate,
Faster and Safer**

WITTEK Automatic Roll Feeds increase production and profits, keeping punch presses operating up to capacity, assuring higher output and a better product.



WITTEK Reel Stands easily handle any kind of roll stock — enabling one man to center heavy coils without loss of time. Available in 6 models.

Write for Bulletin 'HF' giving complete information on WITTEK equipment.

WITTEK

Automatic Roll Feeds

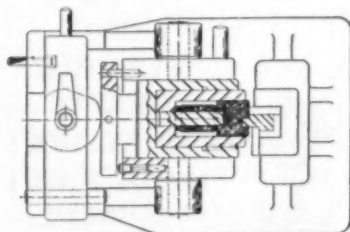


WITTEK Feeds handle any stock from coils in lengths up to 24" press stroke. Available in single roll, double roll and compound types with straightener. Installed on any size or make of press without alteration.

WITTEK MANUFACTURING CO.
4305-9 W. 24th Place, Chicago, Ill.

An Interesting Broaching Job

A good illustration of the high productivity possible with broaching, is shown, representing the broaching of a flexible coupling. The slots between the three jaws were formerly milled at the rate of 9 to 10 an hour.



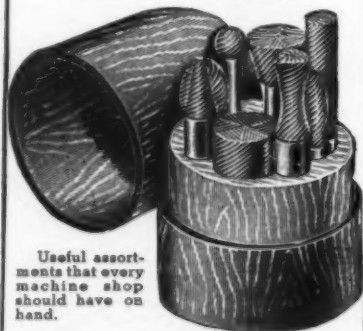
Broaching stepped this up to between 50 and 60 an hour. Three passes of the broach are included in this, to finish the three slots, with indexing after each cycle of the broach. The

drawing shows the top of the fixture, which is pivoted two ways. To load the part, the fixture is swung back and the part dropped into a locating bushing over a mandrel.

At the end of the first stroke of the broach, a cam in the fixture pulls back the locating bushing and part. This



GROBET Hand Cut ROTARY FILES ARE THE BEST



Useful assortments that every machine shop should have on hand.

Ask for catalog WR

Grobet File Corp. of America
3 PARK PL. NEW YORK

permits indexing during the return stroke of the broach. Index locating is by means of the pin shown at the extreme left. Just below this pin is a hand-operated cam for pushing the locating bushing and part back and locking it in broaching position after indexing.

The broach may be classified as a keyway slotting broach of special con-

ARMGLO CO.

Manufacturers of

Manual and Automatic Resistance
WELDING PRODUCTION EQUIPMENT
with Magnetic Timing Control

also

DIE FILING & BELT SURFACING MACHINES

Write for complete details

ARMGLO CO., 3520 W. Pierce Street,
MILWAUKEE, WIS.

Announcing!

FEED AS YOU NEED CHUCK



A drill can be held within the body of the FEED AS YOU NEED chuck and fed out by means of a screw arrangement. This drawing and repelling action of the chuck permits the operator to have only the amount of drill projecting that is necessary to go through the work and drill bushing.

Breakage of drills is eliminated with this new method of holding and driving drills, because of a shorter grip.

Complete information regarding this new chuck can be secured from the following agents:

L. C. Bigelow & Company, New York City

Gross & Heming, Detroit

Camm Blades Mch. Company, Milwaukee

E. A. Kinsey Company, Indianapolis

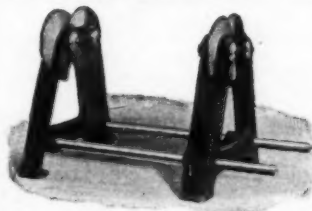
E. T. Oliver, Cleveland

—SCULLY-JONES AND COMPANY—

1901 S. Rockwell Street,

Chicago, Illinois

ANDERSON Improved Balancing Ways



Every shop handling rotating parts needs this simple, sturdy, dependable device for balancing, straightening and truing operations. Saves time and trouble and assures better work.

Four chilled iron discs rotate with minimum friction on sensitive special bearings, giving a prompt, sure indication of whether or not the work is in perfect balance.

Write NOW for full information.

Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	68 in.	10,000

ANDERSON BROS. MFG. CO., ROCKFORD, ILL.
1907 Kishwaukee St.

tour, designed to produce the proper radii at the corners, etc. in addition to finishing the jaw faces. The same principle of fixture and broach design has also been applied successfully by Colonial Broach Co., to the broaching of clutch jaws.

Dayton Rogers "B" Pneumatic Die Cushion

The Dayton Rogers Mfg. Co., 2830 South Thirteenth Ave., Minneapolis, Minn., announce their new model "B" Universal Pneumatic Die Cushion.

These new Cushions, with hollow steel stems, are now made in seven sizes, having piston diameters from four to 14 inches.

It is explained that this added hollow piston stem design allows the scrap slugs to fall through the cushion cylinder which makes the new design adaptable to both combination blanking, drawing, and piercing, as well as particularly adapted to stripper control action on all compound blanking and piercing dies. No tanks are necessary for all standard drawing operations.

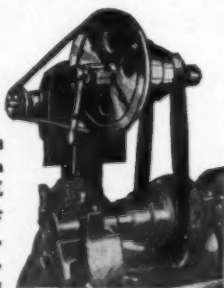
Each cushion is supplied complete with a reducing regulator control valve and pressure gauge.

The cushion cylinders may be mounted direct to the bottom side of the bolster plate or to the bottom of the bed frame of the average inclin-



GUARANTEED FOR 5 YEARS

When you purchase a **STEEGE Drive** for your lathe, shaper, miller, etc., you're protected by our broad 5-year guarantee.



STEEGE Drives are easily installed—prices \$35.00 up—sent on 30 days' approval. *Let us send catalog.*

W. L. STEEGE MACHINERY CO.
(Our 23rd Year)
548 W. Monroe St., Chicago, Ill.

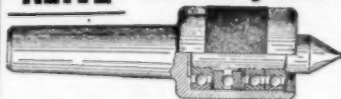
able or straight side punch press.

The correct height of the strippers on compound blanking dies, as well as the draw rings on drawing dies, are maintained by the hand wheel adjustment feature; thus, compensating for bolster plate thickness variation and die sharpening or grinding.

Each of the seven sizes of cushions can be provided with two different sizes of hollow steel piston stems.

In addressing the makers for further information, please refer to The **BLUE BOOK**.

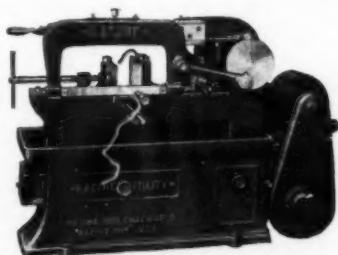
"ALIVE" Ball Bearing Centers



"They turn with the work"

Write **TODAY**—and let us tell you more about them.

MODERN MACHINE CORP.
323 Berry St., Brooklyn, N. Y.



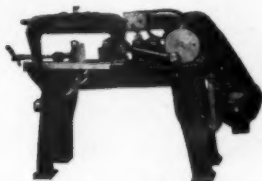
No. W-3B-Wet Cut, high speed 6'x6'
motor drive

Fast, Smooth Action—Hy-
draulic Feed and control—
2 speeds standard.

"Standard The World Over"

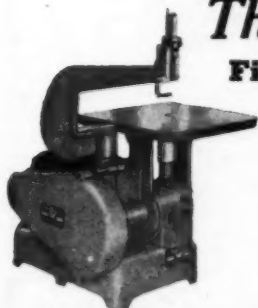
RACINE

The new, fast cutting, Racine Utility
saws—Hydraulic Feed-Dry Cutting or
Wet Cutting—Write for remarkably
low prices—Also a full line of heavy
duty machines up to 14x20" capacity.



No. D-3B Dry Cut 6'x6'

RACINE TOOL & MACHINE COMPANY
1754 STATE ST. RACINE, WIS. U. S. A.



The "BUTTERFLY"

Filing and Die Making Machine

NAMED "BUTTERFLY" BECAUSE IT IS NOISELESS IN ITS
RUNNING AS A BUTTERFLY IS IN ITS FLYING.
(Reg. U. S. Pat. Off.)

NEW MODELS D. & E. L.

"D"—10" table. "EL"—12" table. Saves about
60% or more in labor,—in sawing, filing and lapping
on dies, gauges, tools, machine parts, etc.

The "Butterfly" owes its ever increasing popu-
larity to its high standard of efficiency. It is the
quietest machine of its kind and is well adapted to
highly accurate work. It is being used by the leading
manufacturers of the United States and Europe and
also by the United States Government.

Write for folder D. and E. L.

Constructed as per speci-
fications of United States Naval
Aircraft Factories.

New design patent applied for.

The Butterfly is mechani-
cally perfect and with it goes
an unlimited guarantee.

Beware of Imitations!

Our machine carries the
Butterfly trade mark.

Harvey Manufacturing Corp.

MANUFACTURING PLANT AND
EXECUTIVE OFFICES

161 GRAND ST., NEW YORK, N. Y.

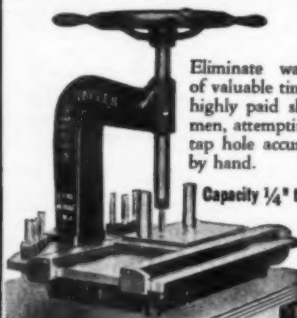
Gaston Power Tools

Two high-speed portable grinders, designed for fast flat grinding and sanding, have been announced by Gaston Power Tools, 2657 W. 95th St., Evergreen Park, Ill. The new machines



have no gears and only two bearings and are powered by induction motors of $\frac{1}{2}$ and 1 h.p. Each size is built to withstand a momentary 100% overload. Both are operated on 220 volt, 3 phase, 60 cycle power circuits.

Precision Tool Room Tapping SAVES TIME—TAPS—TROUBLE



Eliminate wasting of valuable time by highly paid skilled men, attempting to tap hole accurately by hand.

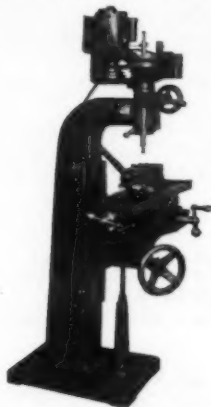
Capacity $\frac{1}{4}$ " to $\frac{7}{8}$ "

The Master Tapper Co.
2 Main St., Belleville, N. J.

The assembly is compact and dust-proof and seems to be rugged and well-built. In writing to the manufacturer for further information, mention of The BLUE BOOK will insure prompt service.

New Index Milling Head

The Index No. 38 vertical mill, announced in the June, 1938, issue of The



BLUE BOOK, is now equipped with a milling head having a movable quill of $3\frac{1}{4}$ in. travel. This advance eliminates the necessity of a counterbalance and gives greater rigidity and accuracy than the old style head. The improved machine is being marketed by the Blank and Buxton Machinery Co., 606 N. Mechanic St., Jackson, Mich.

Centerless Grinding (CONTRACT WORK)

Precision, Accuracy, Promptness

Let us quote on your specifications.

THE HEIM COMPANY
Fairfield, Connecticut

Unishear Contest Winner

In the Contest started last September to find the oldest "Mighty Midget" Unishear still in use, Stanley Electric



Tool Division, New Britain, Conn., announces that the winner was located in Chicago. Mr. W. J. Ross, Manager of the Chief Sign Co., who owned the oldest "Mighty Midget" has received a brand new Unishear of the same design.

In describing his old "Mighty Midget", Mr. Ross writes that it is the company's oldest employee. "For a number of years," he writes, "it was employed in cutting metals for auto truck bodies. Now we are using it in the fabrication of electric and neon sign boxes and faces. It has been handled by all types of men; some careful, some indifferent, and has stood up under these years of punishment with the minimum cost of a minor repair."

New Doall Literature

A 95-page "Handbook on Contour Sawing," with a section on cutting machining costs, is now offered by Continental Machine Specialties, 1300 South Washington Ave., Minneapolis. It describes interestingly the history and development of filing and sawing with special reference to the use of the company's Doall machines. A new bulletin on the Continental Doall band filer is also available to BLUE BOOK readers.

ACE SPOT WELDERS

**For Economically Fastening or Joining
Assemblies of Sheet Metal or Wire**

*Cheaper, Faster and Better
than riveting*

**Spot welds are made in a fractional part of
a second.**

**Average cost of current for 1,000 spot
welds is only 3 cents.**

Modern design, based on simplicity, use of welded steel in place of heavy castings and incorporation of latest developments in resistance welding characterizes these ACE SPOT WELDERS. These factors provide easy, speedy operation, low first cost, low operating cost and dependability. Made in sizes from 5 KW up.

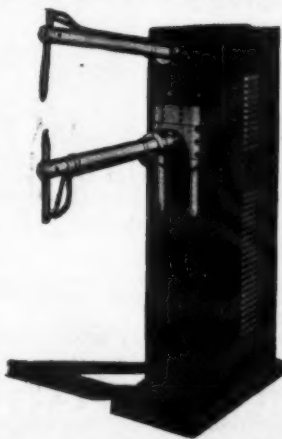
Send for detailed literature and prices today

PIER EQUIPMENT MFG. CO.

WELDING EQUIPMENT DIVISION

642 Cross St., Benton Harbor, Mich.

Makers of Good Equipment Since 1922



**WARDWELL
SAW SHARPENER****MODEL EC
BENCH TYPE****Automatically Sharpens Hack,
Band & Circular Saws**

with teeth as fine as 32 to the inch,
at a speed of 30 to 75 per minute.

WRITE FOR CIRCULAR

The Wardwell Mfg. Co.
3165 Fulton Rd. Cleveland, O.

"POWERMASTER"**GIVES
YOU . . .**

An infinitely variable speed range under instant finger-tip control — freedom from belt shifting and ability to locate machines exactly where desired, independent of lineshaft. Operation is speedier and more flexible and production costs are reduced.



"POWERMASTER" is readily attached to most machine tools with a simple four-bolt mounting.

UNCONDITIONALLY GUARANTEED—

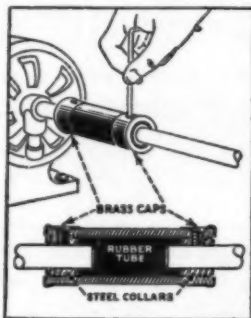
Write for details and price

"POWERMASTER"

25 East Fourth St., New York, N.Y.

Rubber Flexible Couplings

For drives as high as $\frac{1}{4}$ h.p. at a speed of 1750 r.p.m., the Flexible Coupling Mfg. Co., 7401 S. Sangamon St., Chicago, is offering a series of couplings utilizing rubber tubing as the flexible member. The coupling uses no rolling or scraping parts, thus needing no lubrication whatever. It consists of a length of rubber tubing, supplied in three grades, two steel collars which fit the tubing to the shaft, and two brass caps which protect the ends of the tubing. The coupling is held to the shaft by a pair of set-screws through the steel collars.



It is claimed that the coupling dampens noise and vibration, cushions starting torque, and provides adequate flexibility. The rubber connection serves as insulation between the shaft ends. It has been made available in lengths of from $1\frac{1}{4}$ to 8 inches in $\frac{1}{8}$ in. steps, with bores from $\frac{5}{16}$ to $\frac{1}{2}$ inch.

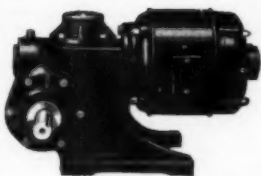
In writing, please mention The BLUE BOOK.

Ex-Cell-O Publications

New catalogs of the Ex-Cell-O Corp., 1188 Oakman Blvd., Detroit, describing the company's new precision facing and boring machines, have recently been issued. Bulletin 11181, describing the facing machine, and Bulletin 11481, describing the boring machine, will be sent upon application to the manufacturer.



Janette



Illustrating the LWD, double reduction, worm gear style of speed reducer.

Motorized Speed Reducers

10 DIFFERENT STYLES

from which to select the exact type of speed reducer to meet your individual requirements.

1/50 to 7-1/2 H. P.

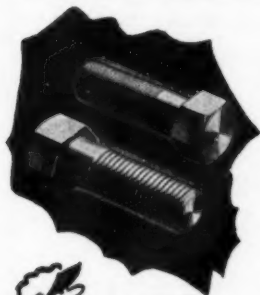
The diversity of the Janette custom built line of motorized speed reducers, enables us to supply a machine for almost any purpose.

Ask For Bulletin 22-25D

ROTARY CONVERTERS — MOTOR GENERATORS — BLOWER WHEELS

Janette Manufacturing Company

556-558 West Monroe Street Chicago, Ill. U. S. A.



Extra Values for Cap Screw Buyers

Let TRIPLEX Cap Screws save money for you —speed assembly, banish misfits, give you insurance against breakage. Here's a cap screw of fine steel, strong, uniform, accurately threaded. Shaved heads and washer faced full-finished, and heat-treated or bright 1035's —they look their quality, protect your judgment in buying them. Shipping service geared to your needs.

Send for free samples and prices, today.

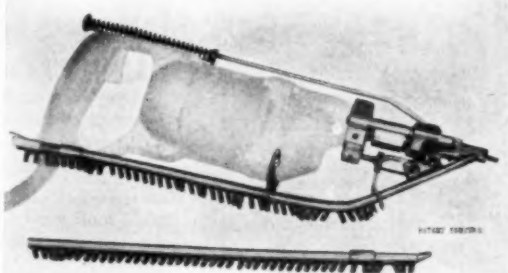
THE TRIPLEX SCREW CO.

CAP AND SET SCREWS, BOLTS, NUTS AND RIVETS

★ 5377 Grant Avenue • Cleveland, Ohio ★

Mechanical Screw Feeder

An interesting new automatic device which, the manufacturer claims, will drive screws or bolts in wood or metal without damage either to the screw or to the work, has been developed by the Akron Automatic Machine Co., 100 Beech St., Akron, Ohio. The device, which feeds screws from a replaceable magazine, is light and compact and can be attached to any kind of power driver, hand electric, pneumatic, or flexible shaft. The magazine is hopper-fed, the operator having a supply of magazines on hand at his work. An adjustable clutch prevents loose screws, over-running, stripped threads, and marring of the work or screw heads. The manufacturer will give full information if you mention The BLUE BOOK.



A New Blueprint Envelope

The new Visulope, announced by Curtis 1000 Inc., 1000 University Ave.,

St. Paul, Minn., is an envelope designed to afford permanent protection to shop blueprints and work orders. Performance figures on several installations indicate that the savings effected should pay for the cost of the envelopes in a relatively short time.

It is made of a thermo-plastic sheet and is said to withstand moisture. Other claims include not becoming brittle, being proof against oil and grease, non-inflammability and resisting stretch and shrinkage.

The Visulope affords protection to blueprints which are being subjected to frequent handling and rough shop usage.

Elastuf Steel Distribution

The "Elastuf Group of Related Machinery Steels", developed by the Horace T. Potts Co., of Philadelphia,

— GEARS —

**Spur—Helical—Worm—
Bevel—Miter, Etc.**

We do broaching and all kinds of grinding.

We specialize in grinding hardened steel bushings, cam rollers, etc.

Prompt service and quality has retained a large list of customers for 25 years.

TAYLOR MACHINE CO.

1919 E. 61st St., Cleveland, Ohio



Universal Die Cushions for deep drawing, forming die, pressure pad control, and blanking die stripper actions.

Write for engineering power press die booklet.

Dayton Rogers Mfg. Co.
Minneapolis, Minn.



BAUMGARTH "Pumpless" SAFETY BLOW TORCHES

Compact, easily handled yet it gives large blow torch performance. Delivers a large . . . clean . . . hot . . . steady flame or a small pointed flame. When adjusted, maintains desired flame until tank is empty. Furnished with wind guard and soldering iron hook. Heavy seamless brass tank, stay-bolted for extra strength. Price \$10.00 f. o. b. Chicago.

Write for descriptive folder.

The BAUMGARTH MFG. CO.,

WYCO Bldg.,

836 Hubbard St.,

Chicago, Illinois



BALDOR GRINDERS
are built by Motor Specialists

STURDY BUILT—
for Long, Hard Service

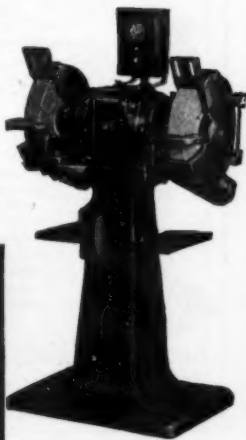
A complete line—6" to 12"; Bench and Pedestal Types; All Heavy Duty, Ball-bearing; Price range, \$19.50 to \$197.00. 1 YEAR GUARANTEE.

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BALL BEARING **GRINDERS**



will now be available over a large section of the Eastern industrial territory. Formerly distributed entirely through Potts warehouses in Philadelphia and Baltimore, and through Brown-Wales in Boston, these special formula steels can now be obtained through Beals, McCarthy & Rogers in Buffalo, and Equitable Equipment Co., in New Orleans.

The Elastuf Steels include a number of grades of machinable steels offering high tensile properties without the need for intermediate heat treatments.

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Portable
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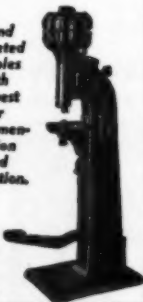


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include both Noiseless Spinning and Vibrating Hammer types of machines —also Vertical and Horizontal Multiple Spindle Spinning Machines.



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**THE GRANT MFG.
& MACHINE CO.**
C. E. Station
BRIDGEPORT, CONN.

Brickner-Kropf Emery Wheel Contour Dresser

A diamond tool attachment for dressing grinding wheels for accurate contour cutting is being announced by the Brickner-Kropf Machine Co., of Muskegon Heights, Mich. The device uti-



lizes a template which is a positive reproduction of the grinding profile desired, the tool being held in place by a magnetic chuck. The makers claim a great saving of time in the dressing of irregular contours.

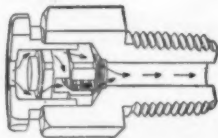
In writing for additional information, please mention The BLUE BOOK.

Heavy Duty Alemite

A new, free-flow giant Alemite button head fitting, designed to speed-up lubrication of heavy machinery, is announced by the Stewart-Warner Corp., Chicago. Bearings requiring large amounts of lubricant can be oiled in less time than with older types of fittings, and with less chance of damage to grease gun equipment through overloading, the manufacturer states.

In the new fittings, the usual valve core has been replaced with one which has a flat face and seat. When open, this is said to offer practically no impediment to the flow of lubricant. By expanding the diameter of the valve

retaining-spring, lubricant flows unobstructed through the center of the spring and not through its compressed coils. The improved valve opens easily under slight pressure, and provides an effective and tight seal against the loss of lubricant when the pressure is removed.



The bodies of the new fittings are hardened to withstand rough treatment. Their smooth tops, which eliminate the cutting or wearing of the coupling sealing washer, are a new feature.

Ordinarily it is impractical to bring heavy machinery to a power-driven compressor, and many operators rely on hand-operated portable compressors to lubricate their equipment. Although many of the portable compressors are capable of producing high pressures,

forcing lubricant through partially-obstructed fittings requires time, labor and a strain on equipment which can be eliminated by the new fitting, Stewart-Warner engineers claim.

Westinghouse Strip Heaters

Two new types of strip heaters designed to produce fast, economical heat are announced by the Westinghouse Electric & Mfg. Co. Made in two temperature ratings of 750°F. and 1200°F. on the sheath, these heaters are particularly applicable on crane cabs, valve house, elevators, ovens,



TANNEWITZ 24" Hi-Speed Band Saw

SAWS NEARLY EVERYTHING

Including Wood, Sheet Steel, Brass and Aluminum Casting Gates, etc.

1½ H. P. Direct Motor Drive.

Also 30"-36"-42" Sizes.

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pocket case.

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Measures to
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Measuring range 5-5/16"

Total length 8".

Scales: 1/16" with vernier
1/128".

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Decimal equivalents on re-
verse side of gage.

Glass-hard jaws.

Fine workmanship.
A precision tool at a reasonable price.

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BURKE MILLING MACHINES Make Fast Work of Small Jobs

Motor
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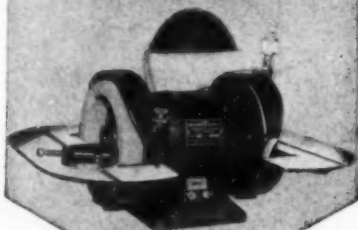
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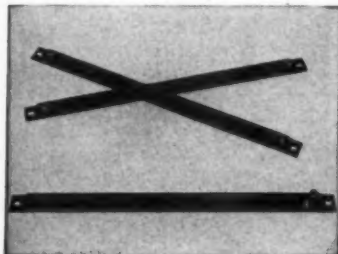
This grinder removes metal
fast when rough grinding
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metal water tanks, pipe lines, hydrants, hot tables, metal moulds, foundry platens — wherever ease of application and convenience are requirements.



Heaters may be obtained either with both terminals at one end or at opposite ends for installation convenience. Heating elements, with refractory insulation and sealed against moisture, are completely enclosed and bolt holes are provided at each end for quick and permanent installation.

Available for operation on 115 volts, 230 volts and two styles for 250 volts, the heaters include sizes of 8, 12, 18, 24, 30½, 36 and 43 inches in length with ratings from 150 to 1250 watts.

In writing, please mention The BLUE BOOK.

Welding In Pictures

Lincoln Electric Company's "Pictorial of Welding Progress," showing interesting modern applications and methods of arc welding will be sent to readers of The BLUE BOOK who write to the company at Cleveland, Ohio.

No. 3879½ Goggle
Leather Side Shield



**Industrial
EYE
Protectors**

SELLSTROM EXCEL-QUALITY

Styles specially adapted to comfort-needs of every working craft. Light weight...adjustable...ventilated...economical. WRITE for special information about Welders' Helmets, Goggles, Spectacles, Lenses and Respirators.

Sellstrom Mfg. Co., 646 N. Aberdeen St., Chicago

A New Acceleration Controller for Electric Motors

For automatically controlling the acceleration of either A.C. or D.C. motors, the Electric Controller and Mfg. Co., 2682 E. 79th St., Cleveland, announces a complete new line of starters and controllers using the company's new Neo-Time acceleration.

The Neo-Time principle is based on

the time required to charge a condenser to a predetermined voltage. When this voltage is reached, the condenser discharges through a neon tube to cause the first acceleration contactor to close. When this contactor closes, the same timing circuit is re-energized to close the next accelerating contactor and this operation is repeated until the motor is operating at full line voltage.

The system of regulating motor acceleration by a condenser and discharge tube results in a compact and simple mechanism, relatively trouble-free. Users of alternating-current machinery will particularly appreciate these qualities. It avoids the use of special accelerating relays used in the past to provide smooth and safe starting for large motors.

The 75 h.p., 230 volt starter in the new line permits a range of from 3 to 30 seconds per acceleration step. This range is accomplished by a handy adjusting dial. With five accelerating steps on this model, the range of elapsed times from no speed to full speed would be from 15 seconds to about 160 seconds. Again, with the use of various resistors these ranges may be made either longer or shorter, as desired.

In writing to the manufacturer, please mention The BLUE BOOK.



GITS Oilers

• Your lubrication problems, whether large or small, will find the correct answer in the Gits Line. If your requirements are of special nature, send us your specifications.

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KEEP STOCK OFF THE FLOOR—SAVE TIME, STEPS, MONEY

Handiest Racks keep bar stock, pipe and shafting neatly piled in plain sight. You can tell by a glance at them how much of each size you have on hand.

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Grinding Wheel Dressers

We make
all types
of
Dressers
and
Cutters



Write
for
Catalog
"H"

DESMOND-STEPHAN MFG. CO.
URBANA, OHIO
The Canadian Desmond-Stephan Mfg. Co., Ltd.
Hamilton, Ontario, Canada

Super's Cardimond Wheel Dressing Tool

A synthetic stone, claimed to have the physical and chemical properties of the diamond, has recently been announced by the Super Tool Co., 21650 Hoover Rd., Detroit.

For the benefit of the technically minded, the manufacturers assert that an X-ray examination of the stone shows that although it is composed of many smaller ones, the finished product is indistinguishable from the natural diamond. Chemical analysis and combustion tests, showing the similarity between Cardimond and diamond, have also been made. The use of a number of small diamonds in the makeup of the stone gives an irregular grain structure which lends resistance to wear and breakage.

It is processed in sizes of 1½ karats and larger and looks very much like the natural diamond. The stones are uniform in structure and quality. They are said to be usable in industry wherever natural diamonds are used.



MAGNETIC CHUCK USERS— NEU-T-ROL ELIMINATES

With NEU-T-ROL no extra operations are necessary with a babbitt hammer or crowbar . . . in removing work from a magnetic chuck. NEU-T-ROL saves time . . . prevents damaging, scoring and marring of the work and magnetic chuck and avoids bruised knuckles . . . by releasing the work completely and demagnetizing it.

**T
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NEU-T-ROL is available for all sizes of magnetic chucks. It is **useful** on the smaller sizes and **necessary** on large chucks. Easily installed as it replaces existing switch and connects to same D. C. wires.

Write **TODAY** for full information

Electro-Matic Products Co.
4820 DEMING PLACE
CHICAGO, ILLINOIS



Stanley "Victor" Electric Drills

Two new "Victor" Portable Electric Drills, Nos. 581 and 341, designed for use by contractors, mechanics, plumb-



ers, heating and ventilating contractors and maintenance men, are announced by Stanley Electric Tool Division, New Britain, Conn. Sturdy,

compact, low priced, reserve power universal motors, No. 581 has a chuck capacity of $\frac{3}{8}$ " and No. 341 has chuck capacity of $\frac{1}{4}$ ". It is said both drills have nickel steel gears, specially heat treated, are full ball bearing, have combination breast plate and spade handle, and pipe handle which is detachable for close quarter work.

Many interesting facts and specifications on these two new drills are described in a Bulletin, copies of which are available upon request. In writing please mention The BLUE BOOK.

CARROLL Universal Dividing Heads

20 Years of Popularity. 6", 10 $\frac{1}{2}$ " 12" Swing. Right or Left Hand Type.



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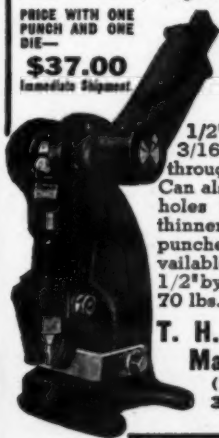
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Built for hard, tough work — die cannot lose alignment with punch — all parts interchangeable.

PRICE WITH ONE PUNCH AND ONE DIE—

\$37.00

Immediate Shipment.



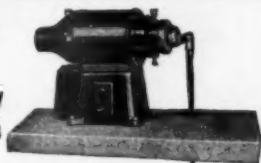
Capacity — 1/2" holes through 3/16" steel; 13/32" through 1/4" steel. Can also be made for holes up to 7/8" in thinner metal. Stock punches and dies available from 1/16 to 1/2" by 64ths. Weight, 70 lbs.

T. H. Lewthwaite Machine Co.

(Est. 1890)

311 E. 47th St., NEW YORK

Time
and
Money
Savers



Speed Lathes

For economy and high production in grinding, lapping, polishing and finishing small parts. Readily adapted with collets or step chucks to handle work at low unit cost. Hand or foot operated, with patented automatic brake. Two-speed dust-proof motor will operate continuously without overheating.

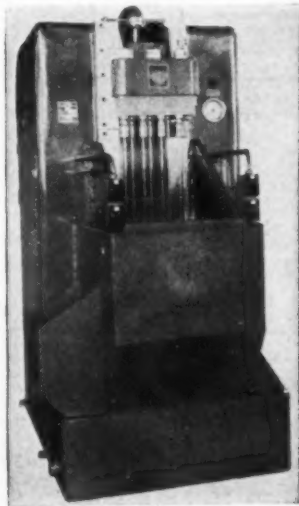
Send today for circular 351

Schauer Machine Co.

2064 Reading Road, Cincinnati, O.

American Hydraulic Broaching Machine

A new vertical hydraulic broaching machine is announced by the American Broach and Machine Co., of Ann Arbor, Mich. It represents an improvement over the company's earlier models, having increased rigidity and smoother positive cutting which give



a longer life to the broaching tool and a smoother, finer, finish to the hole.

The unit features a heavy, box-type construction in which the machine column is integral with the lower base,

and a broach pulling cylinder slide with which the ways and pulling lug are cast integral, giving added strength to the machine. This type of cylinder slide is said to give a well-balanced mass of weight to the cutting tools, with resulting prolonged tool life and finer finishes.

With standard equipment, the operation of the machine is semi-automatic, the operator placing the work over the shank of the broaches and pushing the starter button. Successive automatic operations then raise the broaches into the broach heads, pulling the broaches through the work on the cutting stroke, deflecting the work into the discharge chute, and returning the broaches and heads to the starting position. The manufacturer is prepared to add features that will make the machine fully automatic in its operation.

The advantages claimed by the makers for the vertical type of broaching machine are easier loading and handling of work, easier broaching because the suspended tool must follow the hole, and lower cost of broaches because a shorter, single-shank tool is used.

A descriptive circular giving full details of the construction and operation of the vertical hydraulic broaching machine is available to readers of *The BLUE BOOK*.

A Handy Drill and Reamer Chart

The Danly Machine Products Co., Cicero Station, Chicago, is offering a chart of drill and reamer sizes for dowel pins. Write to the company, mentioning *The BLUE BOOK*.



HAMILTON — MUEHLMATT SUPER SENSITIVE DRILLING MACHINES

Drilling small holes in the smallest wire gage sizes is no problem with Muehlmann Drilling Machines. They are used extensively for drilling Diesel Injector Nozzles, Instrument and Jewelry work. Users report 100% savings on drill breakage.

Muehlmann Drilling Machines are the answer to your small drilling problems. Let us tell you more about them. *Write for information.*

**A. MUEHLMATT DIVISION OF
THE HAMILTON TOOL COMPANY**

**Hamilton,
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IT'S HERE!**Beverly
B-3****Throatless
Shear****A New Heavy
Duty Bench Type**

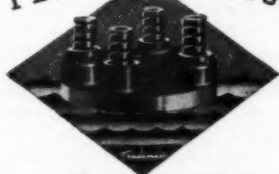
Maximum shearing capacity—
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Reasonably priced—send for descriptive circular

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OF KALAMAZOO**GRINDERS**

Tool Production and Disc
1/4 H. P. to 20 H. P.

**POLISHERS**

1 H. P. to 50 H. P.—A model
for every application



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Quality Grinders and Polishers. Just
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letterhead for complete literature.

Hammond Machinery Builders
KALAMAZOO, MICHIGAN U.S.A.
1614 DOUGLAS AVE.

Ekstrom, Carlson No. 33 Skid Lift Truck

There has been a demand of late for an inexpensive, efficient skid lift truck. To meet this, the Ekstrom, Carlson & Co., Rockford, Ill., have built and marketed their No. 33 Skid Lift Truck.

There is a place in almost every industry where handling, bending, and lifting time are items of expense that must be considered. For manufacturers who are cost conscious, the E. C. No. 33 Skid Lift Truck will prove a worthy investment.

The Truck has an all-steel welded frame, heavy duty gear box equipped with worm and worm gear (operating in a bath of oil) to which a high grade steel cable is connected for raising and lowering the platform which is accomplished by means of a hand crank. The Skid Lift Truck has swivel wheels on one end which facilitates easy and free movement. The truck is said to be capable of lifting from 1000 to 1500 pounds, and can be raised to 33-inches and lowered to the minimum of a 6½-inches high skid which is to be lifted. Larger trucks can be made to order which will accommodate greater weight and which can be raised to a height suitable for the customer's requirements.

Operation is very simple; just a turn of the crank handle and the truck can be raised to the desired level. When the stack on the skid becomes low, just a turn and the platform is brought to the right height; when the stack becomes too high, another turn in the opposite direction brings it again to the right working level.

The trucks are recommended for furniture, novelty, automotive, screw, and metal products manufacturers.

Printers, die makers, and scores of other industries will find that they are effective time savers. If the loading platform is not in line with the height of the standard transport trucks, the Skid Lift Truck provides a means for easy loading and unloading of material. The toil of lifting and loading in plants



or shipping rooms can be facilitated through use of this inexpensive truck.

In writing for further information please mention The BLUE BOOK.

The New GuildTool Hand Sander

Designed to serve as an all-purpose belt sander in small shops and as auxiliary equipment in larger establishments, the GuildSander has recently been put on the market by the Syracuse GuildTool Co., Syracuse, N. Y. It is a compact, light, inexpensive unit, usable in any position. It is powerful and large enough to perform most sanding jobs, even on slightly curved surfaces. The front pulley may be adapted for use as a spindle sander.

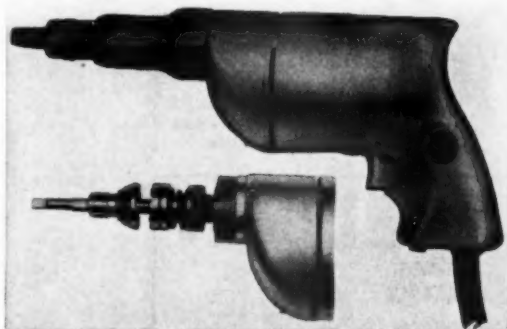
A New Van Dorn Power Screwdriver

This compact electric screwdriver, with an adjustable clutch, has recently been put on the market by the Van Dorn Electric Tool Company, Towson, Md. It is intended to drive screws in sizes from No. 4 to No. 12 and is particularly adapted for use with self-tapping screws. The motor is of the universal type and operates at 110 volts, but it is also available in 220 and 250 volt models.

Standard spindle speed (no load) is given as 750 r.p.m. Net weight is $3\frac{3}{4}$ lbs. Overall length, including bit is $9\frac{1}{2}$ -inches. Clutch ad-

justment is by a knurled collar with a pin through slot in protecting sleeve.

A letter to the manufacturer will



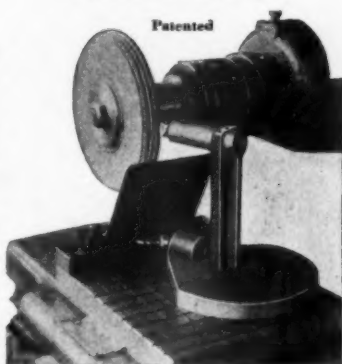
bring complete specifications. Mention of The BLUE BOOK will insure a prompt reply.

Reduce Hours to Minutes . . .

that's how the "B-K" Wheel Contour Dresser cuts the time required to dress an intricate shape on the face of your grinding wheel.

Complicated set ups and measurements are eliminated. No special skill is required to dress a wheel to correspond exactly with template. Form cutters may be profitably ground from the solid. Duplication of ground parts is absolutely assured. No loose parts or complicated adjustments—no measurements required. Adapted to any grinder carrying an 8-inch or smaller wheel.

Descriptive circular and price on request.



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MUSKEGON HEIGHTS, MICH.

\$25 BUYS A POSTEL *f. o. b.* *(Minneapolis)* DIE FILER



A dependable, precision tool that will soon pay for itself.

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Capacities.

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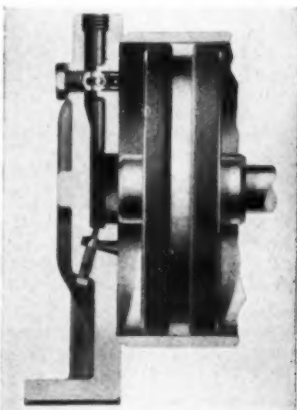
Sheldon Machine Co. Inc.
3257 S. Cottage Grove Ave.,
Chicago, U. S. A.

Machinery
Dealers—
Some territories
still open.



A New Hanna Adjustable Air Cushion

To meet the demand for a cushion which can be adjusted to meet the variables of air velocity, strike, and the relation of cylinder capacity to load, the Hanna Engineering Works, 1763 Elston Ave., Chicago, has developed the cushioning arrangement shown.



After the cushion is adjusted, the operation is entirely automatic. As the cushion sleeve enters the cylinder head, the air trapped between the piston and the cylinder head forms a pneumatic cushion. Thereafter, the speed at which the piston continues to the end of its stroke is controlled by an adjustable



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Start 1939 Right

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WALTON TAP EXTRACTORS



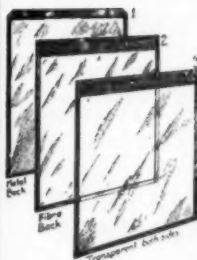
They remove taps broken at or below the surface of the hole easily, quickly and without injury to the threads.

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Protect Shop Orders, Drawings, Blueprints...



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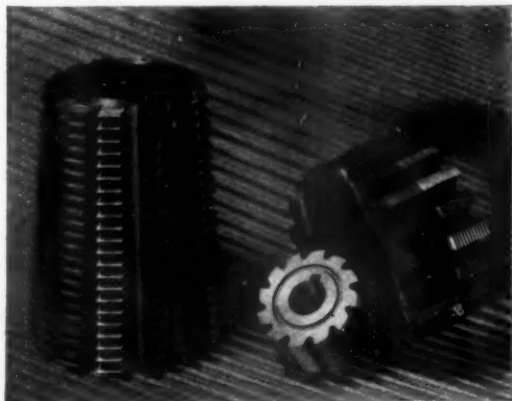
Any size or style to order, stiff or flexible, to suit your requirements.

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THREADS

Detroit Tap's thread milling cutters are finished to the most rigid API or National Standards—by form grinding—for utmost in work accuracy and longest life.



Also: TAPS—ground form threads checked with finest inspection equipment. THREAD GAGES—produced under controlled temperature and humidity. THREAD ROLLING DIES providing lower threading costs through specially selected Detroit steels. Fastest deliveries on special tools.

There is a representative in your territory.

8432 Butler DETROIT TAP & TOOL COMPANY Detroit

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Tannewitz Works, Grand Rapids, Mich.

Adapters, Adjustable

Glenzer Company, J. C., Detroit, Mich.

Angle Dressers

Vinco Tool Co., Detroit, Mich.

Angle Iron Cutting & Notching Machines

Ward Machinery Co., 504 W. Washington, Chicago, Ill.

Arbors

Kearney & Trecker Corp., Milwaukee, Wis.

Balancing Ways

Anderson Bros. Mfg. Co., Rockford, Ill.
Sundstrand Machine Tool Co., Rockford, Ill.

Baling Presses

Galland-Henning Mfg. Co., Milwaukee, Wis.

Band Saw Machines, for Metal

Armstrong-Blum Mfg. Co., 5741 Bloomingdale Ave., Chicago, Ill.

Delta Mfg. Co., Milwaukee, Wis.

Grob Bros., Grafton, Wis.

Oliver Machinery Co., Grand Rapids, Mich.
Tannewitz Works, Grand Rapids, Mich.

Bar Cutters

Buffalo Forge Company, Buffalo, N. Y.

Belt Lacing

Armstrong-Bray & Co., 315 N. Loomis, Chicago

Belt Sanders

Skilaw, Inc., 3304 Elston Ave., Chicago, Ill.

Belts, V-Type

Delta Mfg. Co., Milwaukee, Wis.

Bench Legs, Steel

Standard Pressed Steel Co., Jenkintown, Pa.

Bending Machines, Hand and Power

Armstrong-Blum Mfg. Co., 5741 Bloomingdale Ave., Chicago, Ill.

Buffalo Forge Company, Buffalo, N. Y.

Lewthwaite Machine Co., 311 E. 47th St., New York, N. Y.

Bending Rolls

Buffalo Forge Co., Buffalo, N. Y.
Marshalltown Mfg. Co., Marshalltown, Ia.

Ward Machinery Co., 504 W. Washington, Chicago, Ill.

Bins

Interior Steel Equipment Co., Cleveland, O.
Stacklin Corp., Providence, R. I.

Blades, Hack Saw

Racine Tool & Mch. Co., Racine, Wis.

Blower Wheels (Sirocco Type)

Janette Mfg. Co., 550 W. Monroe St., Chicago

Blowers, Portable Electric

Bremer Electric Mfg. Co., 5108 N. Ravenswood Ave., Chicago

Buffalo Forge Company, Buffalo, N. Y.

Clements Mfg. Co., 0050 Naragansett, Chicago
General Blower Co., 401 N. Peoria St., Chicago

Skilaw, Inc., 3304 Elston Ave., Chicago, Ill.

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Triplex Screw Co., Cleveland, Ohio

Blow Torch, Pumps

Baumgarth Mfg. Co., 830 Hubbard, Chicago.

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Starrett Co., L. S., Athol, Mass.

Boring Bars

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Rigid Tool Holder Co., Detroit, Mich.

Russell Boring Bar Co., Middletown, Ohio

Boring Heads

Flynn Manufacturing Co., Detroit, Mich.

Boring Machines

Ex-Cell-O Corp., Detroit, Mich.

R & L Tools, Philadelphia, Pa.

Brakes, Hand and Power

Drels & Krump Mfg. Co., 7440 So. Loomis Blvd., Chicago, Ill.

Verson Allsteel Press Co., 9303 S. Kenwood Ave., Chicago, Ill.

Ward Machinery Co., 504 W. Washington, Chicago, Ill.

Brazers, Electric

Grob Brothers, Grafton, Wis.
Oliver Machinery Co., Grand Rapids, Mich.

Broaching Machine Tools

Colonial Broach Co., Detroit, Mich.

Broach Sharpening Machines

Colonial Broach Co., Detroit, Mich.

Broaches, Adjustable Clamp

East Shore Machine Products Co., Cleveland, O.

Broaches, Spline and Square

Colonial Bushings Co., Detroit, Mich.

Ex-Cell-O Corp., Detroit, Mich.

Taylor Machine Co., Cleveland, Ohio

Buffers, Bench

Hammond Machinery Builders, Kalamazoo, Mich.
Mail Tool Co., 7742 S. Chicago Ave., Chicago, Ill.

Vonnegut Moulder Corp., Indianapolis, Ind.

Buffers, Pedestal

Vonnegut Moulder Corp., Indianapolis, Ind.

Bushings, Pig

Acme Industrial Co., 210 N. Laflin St., Chicago
Colonial Bushings Co., Detroit, Mich.

Ex-Cell-O Corp., Detroit, Mich.

Bushings, Steel

Acme Industrial Co., 210 N. Laflin St., Chicago
Baumbach Mfg. Co., E. A., 1812 So. Kilbourne Ave., Chicago, Ill.

Universal Engineering Co., Frankenmuth, Mich.

Calipers

Comet Tools, Inc., 39 Union Square, New York
Scherr Co., George, 122 Lafayette St., N. York

Cams, Alloy Steel

Modern Collet & Machine Co., Ecorse, Mich.

Cap Screws

Triplex Screw Co., Cleveland, Ohio

Carbide Tipped Tools

Ex-Cell-O Corp., Detroit, Mich.

Carbide Tool Grinders

Ex-Cell-O Corp., Detroit, Mich.

Centering Machines

Cullman Wheel Co., 1359 Altgeld St., Chicago
Sundstrand Machine Tool Co., Rockford, Ill.

Center Lapping Machines

Ex-Cell-O Corp., Detroit, Mich.

Center Points

Ford Motor Co., Johansson Div., Dearborn, Mich.

Centers, Lathe

Modern Machine Corp., Brooklyn, N. Y.

Motor Tool Mfg. Co., Detroit, Mich.

Nielsen, Inc., Lawton, Mich.

Rigid Tool Holder Co., Detroit, Mich.

Chains, Silent and Roller

Chicago Gear Works, 709 W. Jackson Blvd., Chicago, Ill.

Cullman Wheel Co., 1359 Altgeld St., Chicago

Chamfering Machines, Automatic

Grant Mfg. & Machine Co., Bridgeport, Conn.

Chucking Fingers

Modern Collet & Machine Co., Ecorse, Mich.
Morrison Machine Products Div., Elmira, N. Y.

Chucks, Air

Hannfin Mfg. Co., 621 S. Kolmar Ave., Chgo.
Logansport Machine, Inc., Logansport, Ind.

Tomkins-Johnson Co., Jackson, Mich.

Chucks, Automatic

Procnier Safety Chuck Co., 14 S. Clinton St., Chicago, Ill.

Chucks, Collet

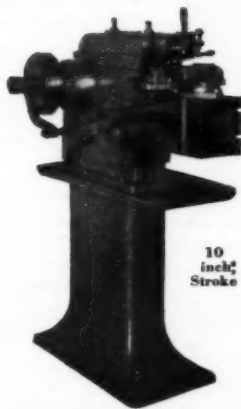
Apex Machine Co., Dayton, Ohio

Hardinge Brothers, Inc., Elmira, N. Y.

Procnier Safety Chuck Co., 14 S. Clinton St., Chicago, Ill.

Universal Eng. Co., Frankenmuth, Mich.

Precision Shaping Machine



10
inch
Stroke

WITH VARIABLE SELF-ACTING LONGITUDINAL and SELF-ACTING VERTICAL TABLE FEEDS IN EITHER DIRECTION.

TWO RAM SPEEDS, 29 and 52 Strokes per minute.

SWIVELLING TABLE.

TOOL HEAD SWIVELS EITHER SIDE to 60° and is accurately indexed. The Tool-holder Block and Tool-post also swivel and the Tool Block can be locked with plunger pin. The Tool-post has a positive cam operated locking arrangement.

SPECIFICATIONS:

Maximum Stroke	ins.	10
Self-Acting Longitudinal Table Movement	ins.	11
Self-Acting Vertical Table Movement	ins.	8 3/4
Vertical Feed of Tool-head	ins.	3 3/4
Length of Ram Guides	ins.	16
Width of Ram Guides	ins.	6
Total Length of Ram	ins.	17 1/2
Length of Cross-Slide	ins.	15
Diameter and Width of Single Pulley	ins.	8 x 1 3/4
TABLE: Top Surface x Depth	ins.	9 1/2 x 7 x 7 1/2
WISE: Width x Depth x Opening of Jaws	ins.	3 1/4 x 1 x 2 1/2
R.P.M. of Single Pulley	approx.	200
Floor Space required	ins.	32 x 26
H.P. required for Lineshaft Drive	approx.	1
H.P. of Motor required	approx.	1
R.P.M. of Motor required	approx.	1400
PRICE.....Single Pulley Machine		\$300.00
PRICE.....Motorized Machine.....Without Motor		\$375.00

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101 Walker St.,

New York, N. Y.

needle valve.

In the back travel of the piston, it is essential that live air act immediately upon the full area of the piston. This is accomplished by the illustrated ball check valve. Were it not for this feature, the reversal of the piston stroke would be very slow, probably with insufficient power to move the load.

Air cylinders embodying this new development are available in diameters of from two inches to 20 inches. Where heavy loads or long strokes necessitate special treatment, modifications of the cushion illustrated provide greater cushioning area and stroke. In addition to cushion control, speed boxes are provided to control the full piston travel.

Full data concerning this new air cushion are available upon application to the manufacturer.

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9", 11", 13", 15" AND 18" SWING

3' to 12' BED LENGTHS

PRICED \$85 TO \$1500

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Apex Machine Co., Dayton, Ohio
 Errington Mech. Labor., Staten Island, N. Y.
 Etico Tool Co., 504 Johnson Ave., Brooklyn, N. Y.
 Hartford Special Mach'y Co., Hartford, Conn.
 Nielsen, Inc., Lawton, Mich.
 Proconier Safety Chuck Co., 14 S. Clinton St., Chicago, Ill.
 Sampson Tool Co., 101 Walker St., New York
 Scully-Jones & Co., 1905 S. Rockwell St., Chicago, Ill.

Chucks, Lathes

L-W Chuck Co., Toledo, Ohio
 Sampson Tool Co., 101 Walker St., New York

Chucks, Magnetic

Brown & Sharpe Mfg. Co., Providence, R. I.

Chucks, Quick Change

Glenzer Company, J. C., Detroit, Mich.
 Jarvis Co., Chas. L., Middletown, Conn.
 Proconier Safety Chuck Co., 14 So. Clinton St., Chicago, Ill.

Clamping Devices, Air Operated

Hannifin Mfg. Co., 621 S. Kolmar Ave., Chgo.

Clamps, Toggle, (Univ. Action)

Knu-Vise Products Co., Detroit, Mich.

Clutches, Friction

Carroll Mfg. Co., L. W., Cincinnati, Ohio.

Conway Clutch Co., Cincinnati, Ohio

Coil Winding Equipment

Ideal Commutator Dresser Co., Sycamore, Ill.

Collets

Apex Machine Co., Dayton, Ohio

Collets and Feed Fingers

Modern Collet & Machine Co., Ecorse, Mich.

Morrison Machine Products Div., Elmira, N. Y.

Collets for all Lathes and Millers

Hardinge Brothers, Inc., Elmira, N. Y.

Modern Collet & Machine Co., Ecorse, Mich.

Sutton Tool Co., Detroit, Mich.

Collets, Quick Change

Jarvis Co., Chas. L., Middletown, Conn.

Collet Tubes

Modern Collet & Machine Co., Ecorse, Mich.

Sutton Tool Co., Detroit, Mich.

Compressors

Federal Products Corp., Providence, R. I.

Compounds, Abrasive

Timesaver Prod. Co., 31 S. Desplaines, Chicago

Compounds, Cleaning, Alkali

Detroit Rex Prod. Co., Detroit, Mich.

Compounds, Grinding

Timesaver Prod. Co., 31 S. Desplaines, Chicago

Compounds, Lapping

Timesaver Prod. Co., 31 S. Desplaines, Chicago

Contract Work Wanted

Burke Machine Tool Co., Conneaut, Ohio

Counterbores

Ex-Cell-O Corp., Detroit, Mich.

Glenzer Company, J. C., Detroit, Mich.

Scully-Jones & Co., 1905 S. Rockwell St., Chicago, Ill.

Counterdrinks

Glenzer Company, J. C., Detroit, Mich.

Severance Tool Mfg. Co., Saginaw, Mich.

Couplings, Belt

Armstrong-Bray & Co., 315 N. Loomis, Chicago

Couplings, Compression Shaft

W. H. Nicholson & Co., Wilkes-Barre, Pa.

Couplings, Flexible

Chicago Die Casting Mfg. Co., 2502 W. Monroe, Chicago

Lovely Flex. Coupling Co., 5026 Lake, Chicago

W. H. Nicholson & Co., Wilkes-Barre, Pa.

Couplings, Friction Clutch

Conway Clutch Co., Cincinnati, Ohio

Couplings, Shaft

W. H. Nicholson & Co., Wilkes-Barre, Pa.

Cut-Off Machines

Modern Machine Tool Co., Jackson, Mich.

Cut-off Saws

Oliver Machinery Co., Grand Rapids, Mich.

Tannewitz Saws, Grand Rapids, Mich.

Cutter Grinders

Gorton Machine Co., Geo., Racine, Wis.

Oliver Instrument Co., Adrian, Mich.

Cutters

Progressive Tool & Cutter Co., Ferndale, Mich.

Putnam Tool Co., Detroit, Mich.

Tomkins-Johnson Co., Jackson, Mich.

Cutters, Ball Socket

Severance Tool Mfg. Co., Saginaw, Mich.

Cutters, Midget Milling

Severance Tool Mfg. Co., Saginaw, Mich.

Cutters, Milling

Brown & Sharpe Mfg. Co., Providence, R. I.

Ex-Cell-O Corp., Detroit, Mich.

Machinists Tool Grinding Co., 2834 W. Lake St., Chicago, Ill.

Modern Machine Tool Co., Jackson, Mich.

Scully-Jones & Co., 1905 S. Rockwell St., Chicago, Ill.

Wiley's Carbide Tool Co., Detroit, Mich.

Cutters, Gear

Michigan Tool Co., Detroit, Mich.

Cutters, Taper Reaming

Severance Tool Mfg. Co., Saginaw, Mich.

Cutters, Tube Burring

Severance Tool Mfg. Co., Saginaw, Mich.

Cutters, Woodruff

Glenzer Company, J. C., Detroit, Mich.

Cylinders, Air

Hanna Engineering Works, 1703 Elston, Chicago

Hannifin Mfg. Co., 621 S. Kolmar, Chicago

Logansport Machine, Inc., Logansport, Ind.

Tomkins-Johnson Co., Jackson, Mich.

Degreasers

Detroit Rex Prod. Co., Detroit, Mich.

Demagnetizers

Alofa Manufacturing Company, Grand Rapids, Mich.

Electro-Matic Products Co., 4829 Deming Place, Chicago, Ill.

Die Casting Machines

Luma Electric Equipment Co., Toledo, Ohio

L-W Chuck Co., Toledo, Ohio

Printz Electric Co., Detroit, Mich.

Victor Machinery Co., 130 S. Clinton St., Chicago, Ill.

Die Casting Machines

Harvill, H. L., Inc., Los Angeles, Cal.

Die Castings

Chicago Die Casting Mfg. Co., 2502 W. Monroe, Chicago.

Die Cushions

Dayton Rogers Mfg. Co., Minneapolis, Minn.

Die Duplicating Machines

Gorton Machine Co., Geo., Racine, Wis.

Die Filers

Continental Machine Specialties, Minneapolis

Grob Brothers, Grafton, Wis.

Jarvis Co., Charles L., Middletown, Conn.

Oliver Instrument Co., Adrian, Mich.

Postal Filing Mch. Co., Minneapolis, Minn.

Die Heads, Self-opening

Apex Machine Co., Dayton, Ohio

Die Making Machines

Armco Co., Milwaukee, Wis.

Continental Machine Specialties, Minneapolis

Grob Brothers, Grafton, Wis.

Harvey Mfg. Co., 161 Grand St., New York

Oliver Instrument Co., Adrian, Mich.

Pratt & Whitney, Hartford, Conn.

Die Makers' Supplies

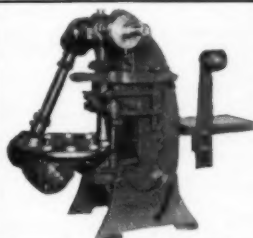
Cerro de Pasco Copper Corp., 44 Wall St., New York, N. Y.

Dayton Rogers Mfg. Co., Minneapolis, Minn.

Hoover Tool Company, Anderson, Ind.

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Baumbach Mfg. Co., E. A., 1812 So. Kilbourne Ave Chicago, Ill.



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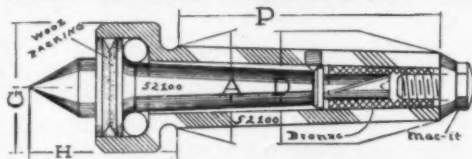


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Operating a Lathe, without a Live Center is like Dragging a Barrel.

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American Tool Works, Inc., Hartford, Conn.
Hamilton Tool Company, Hamilton, Ohio

Dies, Hole Punching
Strippit Corp., Buffalo, N. Y.

Dies, Notching
Strippit Corp., Buffalo, N. Y.

Dividing Heads
Wm. Carroll & Son, Norwood, Cincinnati, O.
L-W Chuck Co., Toledo, Ohio

Dowel Pins, Steel
Acme Industrial Co., 210 N. Laflin St., Chicago
Baumbach Mfg. Co., E. A., 1812 So. Kilbourne Ave., Chicago, Ill.

Draftsmen's Tables
Hamilton Mfg. Co., Two Rivers, Wis.

Drawing Instruments
Wade Instrument Co., Cleveland, Ohio.

Dressers, Contour Grinding
Brickner - Kropf Mch. Co., Muskegon Heights, Mich.

Dressers, Diamond Point
Rodney Welch Industries, Detroit, Mich.

Dressers, Emery Wheel
Carboly Co., Detroit, Mich.

Dressers, Grinding Wheel
Desmond-Stephan Mfg. Co., Urbana, Ohio

Dressers, Precision Wheel
Rodney Welch Industries, Detroit, Mich.

Dressers, Radius
Vince Tool Co., Detroit, Mich.

Dressing Tools
Willey's Carbide Tool Co., Detroit, Mich.

Drill Bushings
Acme Industrial Co., 210 N. Laflin St., Chicago
Universal Eng. Co., Frankennuth, Mich.

Drills, Core
Glenszer Company, J. C., Detroit, Mich.

Drills, Electric
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
Skilaw, Inc., 3304 Elston Ave., Chicago, Ill.

Drill Grinders
Stanley Electric Tool Div., New Britain, Conn.
Black Diamond Saw & Machine Works, Inc.,
Natick, Mass.

Drill Presses
Gallmeyer & Livingston Co., Gr. Rapids, Mich.
Oliver Instrument Co., Adrian, Mich.

Drill Press Heads
Gilman Engineering Works, Janesville, Wis.

Drilling Attachments, High Speed
Walker-Turner Company, Plainfield, N. J.

Drilling Machines, Bench
Dalrue Tools Company, Syracuse, N. Y.

Drilling Machines, Bench
Ayer Manufacturing Co., F. H., Chicago Heights, Ill.
Atlas Press Co., Kalamazoo, Mich.

Drilling Machines, Multiple Spindle
Buffalo Forge Company, Buffalo, N. Y.

Drilling Machines, Portable Electric
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
Skilaw, Inc., 3304 Elston Ave., Chicago, Ill.

Drilling Machines, Vertical
Strand Co., N. A., 5001 N. Wolcott St., Chicago

Drilling Machines, Post
Buffalo Forge Co., Buffalo, N. Y.

Drilling Machines, Sensitive
Atlas Press Co., Kalamazoo, Mich.

Drilling Machines, Sensitive
Buffalo Forge Company, Buffalo, N. Y.

Drilling Machines, Vertical
Burke Machine Tool Co., Conneaut, Ohio

Drilling Machines, Vertical
Hamilton Tool Co., Hamilton, Ohio

Drilling Machines, Vertical
Atlas Press Co., Kalamazoo, Mich.

Drilling Machines, Vertical
Buffalo Forge Company, Buffalo, N. Y.

Drilling Machines, Wall Type
Ayer Manufacturing Co., F. H., Chicago Heights, Ill.

Drives, Lathe
Berkeley Engineering Co., Cleveland, Ohio

Drives, Lathe
Blackstone Tool & Manufact. Co., Detroit, Mich.

Drives, Lathe
Cullman Wheel Co., 1359 Altgeld St., Chicago

Drives, Lathe
Harding Brothers, Inc., Elmira, N. Y.

Drives, Lathe
Powermaster, 25 E. Fourth St., New York, N. Y.

Drives, Lathe
Remco Products Corp., 110 S. Dearborn St., Chicago, Ill.

Drives, Machine Tool
Blackstone Tool & Manufact. Co., Detroit, Mich.

Drives, Shaper
Blackstone Tool & Manufact. Co., Detroit, Mich.

Drives, Variable Speed
Columbia Vari-Speed Company, Wheaton, Ill.

Drives, Variable Speed
Powermaster, 25 E. 4th St., New York, N. Y.

Elevating Tables
Hamilton Tool Company, Hamilton, Ohio

Elevating Tables
Johnson Co., O., Brookfield, Ill.

Emery Wheel Dressers and Cutters
Western Tool & Mfg. Co., Springfield, Ohio

End Mills
Glenszer Company, J. C., Detroit, Mich.

End Mills
Progressive Tool & Cutter Co., Ferndale, Mich.

End Mills
Putnam Tool Co., Detroit, Mich.

End Mills
Willey's Carbide Tool Co., Detroit, Mich.

Engraving Machines
Gorton Machine Co., Geo., Racine, Wis.

Engravers Tools
Hoover Tool Co., Anderson, Ind.

Etching Machines, Electric
Brewster Co., Inc., 50 Church St., New York, N. Y.

Etching Machines, Electric
Ideal Commutator Dresser Co., Sycamore, Ill.

Etching Machines, Electric
Luma Electric Equipment Co., Toledo, Ohio

Etching Machines, Electric
Printz Electric Co., Detroit, Mich.

Exhaust Blowers
Buffalo Forge Company, Buffalo, N. Y.

Experimental Work
American Tool Works, Inc., Hartford, Conn.

Extractors, Tap
Walton Co., Hartford, Conn.

Facers, Spot
Glenszer Company, J. C., Detroit, Mich.

Facing Machines, Precision
Ex-Cell-O Corp., Detroit, Mich.

Feed Fingers for Auto. Screw Machines
Modern Collet & Machine Co., Ecorse, Mich.

Feed Fingers for Auto. Screw Machines
Morrison Machine Products Div., Elmira, N. Y.

Feed Fingers for Auto. Screw Machines
Sutton Tool Co., Detroit, Mich.

Files
Oliver Instrument Co., Adrian, Mich.

Files, Rotary
Ford Mfg. Co., M. A., Davenport, Iowa

Files, Rotary
Grobet File Corp. of America, 3 Park Place,
New York, N. Y.

Files, Rotary
Hamilton Tool Co., Hamilton, Ohio

Files, Rotary
Jarvis Co., Charles L., Middletown, Conn.

Files, Rotary
Pratt & Whitney Div., Hartford, Conn.

Files, Rotary
Severance Tool Mfg. Co., Saginaw, Mich.

Filing Machines
Continental Machine Specialties, Minneapolis

Filing Machines
Grob Brothers, Grafton, Wis.

Filing Machines
Harvey Mfg. Co., 161 Grand St., New York

Filing Machines
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.

Filing Machines
Oliver Instrument Co., Adrian, Mich.

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Ward Machinery Co., 564 W. Washington, Chicago, Ill.

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Flexible Shafts and Accessories

American Rotary Tools Co., 44 Whitehall St., New York, N. Y.

Haskins Co., R. G., 623 S. California, Chicago.

Jarvis Co., Charles L., Middletown, Conn.

Mall Tool Co., 7742 S. Chicago Ave., Chicago.

Stow Manufacturing Company, Binghamton, N. Y.

Strand & Co., 5001 N. Wolcott, Chicago.

Walker-Turner Company, Plainfield, N. J.

Wyzenbeck & Staff, Inc., 838 W. Hubbard, Chgo.

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Lovejoy Flexible Coupling Co., 5026 Lake, Chgo.

W. H. Nicholson & Co., Wilkes-Barre, Pa.

Flexible Shaft Machinery

Haskins Co., R. G., 623 S. California, Chicago.

Jarvis Co., Charles L., Middletown, Conn.

Mall Tool Co., 7742 S. Chicago Ave., Chicago.

Pratt & Whitney, Hartford, Conn.

Stow Manufacturing Company, Binghamton, N. Y.

Strand & Co., 5001 N. Wolcott, Chicago.

Wyzenbeck & Staff, Inc., 838 W. Hubbard, Chgo.

Floating Holders

Glensier Company, J. C., Detroit, Mich.

Flue Lathes

Marshalltown Mfg. Co., Marshalltown, Ia.

Flue Welders

Marshalltown Mfg. Co., Marshalltown, Ia.

Forming Tools

Michican Tool Co., Detroit, Mich.

Morrison Machine Products Div., Elmira, N. Y.

Furniture, Machine Shop

Standard Pressed Steel Co., Jenkintown, Pa.

Western Tool & Mfg. Co., Springfield, Ohio

Gages

Federal Products Corp., Providence, R. I.

Ford Motor Co., Johansson Div., Dearborn, Mich.

Wiley's Carbide Tool Co., Detroit, Mich.

Gages, Gear

Vinco Tool Co., Detroit, Mich.

Gages, Pin, Plug, Ring and Snap

American Tool Works, Inc., Hartford, Conn.

Standard Gage Co., Poughkeepsie, N. Y.

Gages, Pressure

Marshalltown Mfg. Co., Marshalltown, Ia.

Gages, Special

Federal Products Corp., Providence, R. I.

Ford Motor Co., Johansson Div., Dearborn, Mich.

Standard Gage Co., Poughkeepsie, N. Y.

Starrett Co., L. S., Athol, Mass.

Gages, Taper

Hartford Special Machinery Co., Hartford, Conn.

Vinco Tool Co., Detroit, Mich.

Gasoline Electric Light Plants

Janette Mfg. Co., 556 W. Monroe St., Chicago

Gears

Abart Gear & Mch. Co., 4832 W. 16th St., Chgo.

Atlantic Gear Works, 200 Lafayette St., New York, N. Y.

Chicago Gear Works, 760 W. Jackson Blvd., Chicago, Ill.

Taylor Machine Co., Cleveland, Ohio

Gear Pumps

East Shore Machine Products Company, Cleveland, Ohio

Generators

Janette Mfg. Co., 552 W. Monroe St., Chicago

Goggles

Sellstrom Mfg. Co., 646 N. Aberdeen St., Chicago, Ill.

Grinder Live Centers

Motor Tool Mfg. Co., Detroit, Mich.

Grinders, Air

M-B Products, Detroit, Mich.

Grinders, Bench

Baldor Electric Co., St. Louis, Mo.

Hammond Machinery Builders, Kalamazoo, Mich.

Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.

Stanley Electric Tool Div., New Britain, Conn.

Vonnegut Moulder Corp., Indianapolis, Ind.

Walker-Turner Company, Plainfield, N. J.

Grinders, Disc

Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.

Oliver Machinery Co., Grand Rapids, Mich.

Wyzenbeck & Staff, Inc., 838 W. Hubbard, Chgo.

Grinders, External

F. A. Maxwell Co., Bedford, Ohio

Grinders, Flexible Shaft

Haskins Co., R. G., 623 S. California, Chicago.

Jarvis Co., Charles L., Middletown, Conn.

Mall Tool Co., 7742 S. Chicago Ave., Chicago.

Stanley Electric Tool Div., New Britain, Conn.

Stow Manufacturing Company, Binghamton, N. Y.

N. A. Strand & Co., 5001 N. Wolcott, Chicago

Grinders, Hand

Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago, Ill.

Dunore Co., Racine, Wis.

Duro Metal Products Co., 2651 N. Kildare Ave., Chicago, Ill.

Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.

M-B Products Co., Detroit, Mich.

Skilsaw, Inc., 3304 Elston Ave., Chicago, Ill.

Grinders, Heavy Duty

Vonnegut Moulder Corp., Indianapolis, Ind.

Grinders, High Speed

Bridgeport Pattern & Model Works, Bridgeport, Conn.

Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago, Ill.

Jarvis Co., Charles L., Middletown, Conn.

Mall Tool Co., 7742 S. Chicago Ave., Chicago

M-B Products, Detroit, Mich.

Grinders, Internal

F. A. Maxwell Co., Bedford, Ohio

Grinders, Pedestal Electric

Baldor Electric Co., St. Louis, Mo.

Hammond Machinery Builders, Kalamazoo, Mich.

Grinders, Precision

Dunore Co., Racine, Wis.

Grinders, Swing Frame

Vonnegut Moulder Corp., Indianapolis, Ind.

Grinders, Valve

F. A. Maxwell Co., Bedford, Ohio

Grinding Attachments, Drill

Atlas Press Co., Kalamazoo, Mich.

Carlson Mfg. Co., C. H., Minneapolis, Minn.

Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.

Oliver Instrument Co., Adrian, Mich.

Grinding, Centerless (Contract)

Helm Company, Fairfield, Conn.

Machinists Tool Grinding Co., 2834 W. Lake St., Chicago, Ill.

Grinding Machines, Belt

Armiglo Co., Milwaukee, Wis.

Walls Sales Corp., 96 Warren St., New York

Grinding Machines, Cutter, Reamer and Tool

Brown & Sharpe Mfg. Co., Providence, R. I.

Gallmeyer & Livingston Co., Grand Rapids, Mich.

Hammond Machinery Builders, Kalamazoo, Mich.

Oliver Instrument Co., Racine, Wis.

Prosser & Son, 120 Wall St., New York, N. Y.

Grinding Machines, Internal

National Machine Tool Co., Racine, Wis.

Grinding Machines, Portable Electric

Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago, Ill.

Duro Metal Products Co., 2651 N. Kildare Ave., Chicago, Ill.

Haskins Co., R. G., 623 S. California, Chicago.

Jarvis Co., Charles L., Middletown, Conn.

Mall Tool Co., 7742 S. Chicago Ave., Chicago

National Machine Tool Co., Racine, Wis.

Pratt & Whitney, Hartford, Conn.

Stow Manufacturing Company, Binghamton, N. Y.

Strand Co., N. A., 5001 N. Wolcott St., Chicago

Grinding Machines, Surface

Gallmeyer & Livingston Co., Grand Rapids, Mich.

look at the pictures without absorbing a hint as to some place to use a Handee, which after all is clever merchandising.

All of the different models are illustrated, tersely described and priced. Then the different accessories and attachments are introduced, including the router and shaper fixture — the drill press and sensitive drills — bench and foot speed controls — tool post adapter and bench holder. The Workshop presents the familiar Handee in an ingenious mounting for lathe work, drilling and routing, shaping, high speed carving, tool grinding, ripping and disc sanding.

Then there's the combination carver and depth gauge set and a new Hi-Power Grinder for more ambitious shop jobs.

A Master Craftsman's Set of 18 useful cutting, grinding, sawing and engraving accessories is shown — also a Glass Grinding Set for working in glass.

We learn that there is a Junior Workshop Model intended for the

younger homecraftsmen.

Many pages are devoted to various types and shapes of cutting and grinding tools, saws and polishing accessories, mandrels and brushes, followed by a presentation of "Chicago" Soft Polishing Wheels.

Copies of the book may be had by addressing Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago, Ill., and we'll appreciate mention of The BLUE BOOK.

Abrasive Diamond Dressing Tools

The Abrasive Dressing Tool Co., 1550 Broadway, Detroit, Mich. announce a complete new line of diamond dressing tools. The new line is said to be based on a new method of setting diamonds, upon which patent applications are now pending.

The new process is asserted to be "oxide-free" and involves the heating of the diamonds in a multimetal matrix,

Just Specify — "PROGRESSIVE"

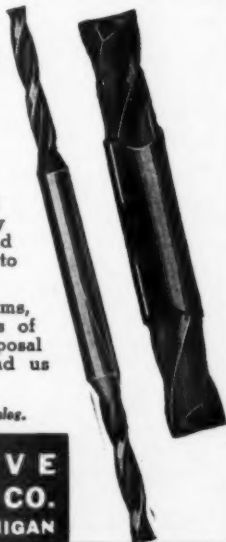
That's the prescription for End Mill Satisfaction—for End Mills that do the jobs faster, better and more economically.

There's a type, form and size of PROGRESSIVE End Mill for every job—designed and made by End Mill Specialists — guaranteed to satisfy YOU.

If you have any End Mill problems, our modern facilities and years of experience are at your disposal without obligation. Just send us your blueprints.

Let us mail you a copy of our free catalog.

**PROGRESSIVE
TOOL & CUTTER CO.**
FERNDALE, MICHIGAN



Buyers' Directory

Grinding Machines, Tap

Gallmeyer & Livingston Co., Grand Rapids, Mich.
Oliver Instrument Co., Adrian, Mich.

Grinding Machines, Tool

Prosser & Son, 120 Wall St., New York, N. Y.

Grinding Service

Machinists Tool Grinding Co., 2634 W. Lake St., Chicago, Ill.

Grinding Wheels

Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Chicago, Ill.
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.

Hack Saw Blades

Armstrong-Blum Mfg. Co., 5741 Bloomingdale Ave., Chicago, Ill.
Starrett Co., L. S., Athol, Mass.

Hack Saw Machines

Armstrong-Blum Mfg. Co., 5741 Bloomingdale Ave., Chicago, Ill.
L-W Chuck Co., Toledo, Ohio
Racine Tool & Mch. Co., Racine, Wis.

Hammers, Portable Electric

Stanley Electric Tool Div., New Britain, Conn.

Hand Saws, Portable Electric

Skilaw, Inc., 3304 Elston Ave., Chicago, Ill.

Hand Screw Machine Live Centers

Motor Tool Mfg. Co., Detroit, Mich.

Hand Screw Machines, Precision

Hardinge Brothers, Inc., Elmira, N. Y.

Heads, Boring

Flynn Manufacturing Co., Detroit, Mich.

Hobs

Michigan Tool Co., Detroit, Mich.

Hole Cutters

Wyzenbeck & Staff, Inc., 838 W. Hubbard, Chgo.

Index Centers

Brown & Sharpe Mfg. Co., Providence, R. I.
Wm. Carroll & Son, Norwood, Cincinnati, Ohio
L-W Chuck Co., Toledo, Ohio

Index Fixtures

Tree Tool & Die Works, Racine, Wis.

Indicators, Dial

Federal Products Corp., Providence, R. I.
Standard Gage Co., Inc., Poughkeepsie, N. Y.
Starrett Co., L. S., Athol, Mass.

Indicators, Speed

Starrett Co., L. S., Athol, Mass.

Indicators, Surface Test

Federal Products Corp., Providence, R. I.
Starrett Co., L. S., Athol, Mass.

Jigs and Fixtures

American Tool Works, Inc., Hartford, Conn.
Hamilton Tool Company, Hamilton, Ohio
Hartford Special Machinery Co., Hartford, Conn.

Joints, Universal

Apex Machine Co., Dayton, Ohio

Keyseating Machines

Burr & Son, John T., Brooklyn, N. Y.

Lathe Centers

Nielsen, Inc., Lawton, Mich.

Lathe Live Centers

Modern Machine Corp., Brooklyn, N. Y.
Motor Tool Mfg. Co., Detroit, Mich.
Rigid Tool Holder Co., Detroit, Mich.

Lathe Drives

Cushman Wheel Co., 1350 Altgeld St., Chicago
Hardinge Brothers, Inc., Elmira, N. Y.

Lathes, Back Geared

Atlas Press Co., Kalamazoo, Mich.
Rivett Lathe & Grinder, Inc., Brighton, Boston
South Bend Lathe Works, South Bend, Ind.

Lathes, Bench

Atlas Press Co., Kalamazoo, Mich.
Delta Mfg. Co., Milwaukee, Wis.
Hardinge Brothers, Inc., Elmira, N. Y.
Rivett Lathe & Grinder, Inc., Brighton, Boston
South Bend Lathe Works, South Bend, Ind.

Lathes, Manufacturing

Sundstrand Machine Tool Co., Rockford, Ill.

Lathes, Polishing & Buffing

Hammond Machinery Builders, Kalamazoo, Mich.
Hardinge Brothers, Inc., Elmira, N. Y.

Lathes, Precision

Gilman Engineering Works, Janesville, Wis.

Lathes, Precision Bench

Stark Tool Company, Waltham, Mass.

Lathes, Screw Cutting

Atlas Press Co., Kalamazoo, Mich.
Hardinge Brothers, Inc., Elmira, N. Y.
South Bend Lathe Works, South Bend, Ind.

Lathes, Speed

Schauer Machine Co., Cincinnati, Ohio

Lathes, Toolroom

Atlas Press Co., Kalamazoo, Mich.
Hardinge Brothers, Inc., Elmira, N. Y.
South Bend Lathe Works, South Bend, Ind.

Layout Fluid

Dayton Rogers Mfg. Co., Minneapolis, Minn.
Michigan Chrome Company, Detroit, Mich.

Layout Plates

Challenge Machinery Co., Grand Haven, Mich.

Leader Pins, Steel

Acme Industrial Co., 210 Laflin St., Chicago, Ill.

Leather Oil Retainers

Gits Bros. Mfg. Co., 1890 S. Kilbourn, Chicago

Lights, Movable, Industrial

Zagora Mch. & Gear Co., J., Charlotte, N. C.

Live Lathe Centers

Glensier Company, J. C., Detroit, Mich.
Modern Machine Corp., Brooklyn, N. Y.
Motor Tool Mfg. Co., Detroit, Mich.

Lock Forming Machines, Power

Ward Machinery Co., 504 W. Washington, Chicago, Ill.

Lubricators, Air

Norgren, C. A., Denver, Colorado

Lubricators, Automatic

M-B Products Co., Detroit, Mich.
Norgren Co., C. A., Denver, Colorado

Magnetic Chuck Demagnetisers

Electro-Matic Products Co., 4820 Deming Place, Chicago, Ill.

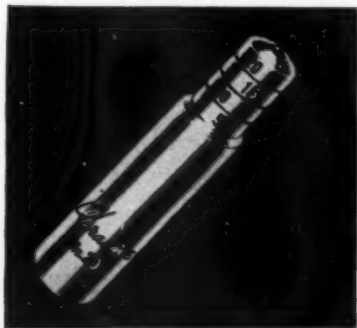
Mandrels, Expanding

W. H. Nicholson & Co., Wilkes-Barre, Pa.
Western Tool & Mfg. Co., Springfield, Ohio

Marking Machines

Ideal Commutator Dresser Co., Sycamore, Ill.
Schmidt, Geo. T., Inc., 1802 Belle Plaine Ave., Chicago, Ill.

without the limitations of a closed furnace. The entire fusing of the metals around the diamonds is completed in 20 seconds with no opportunity for the development of metal oxides. The diamonds, being heated in the absence of oxygen and for only 20 seconds are said to be completely protected from any harmful chemical reactions and do not lose any of their unique qualities of hardness and strength.



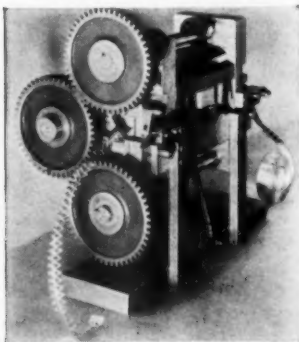
The No. 20 Cluster Type Dressing Tool shown is recommended for medium sized wheel dressing. The spacing of the diamonds in the tool is accomplished in approximately the same manner as their previous method. There are four layers of five diamonds to the layer, weighing $2\frac{1}{2}$ carats. The

tool is asserted to have been very successful for general tool room work as well as numerous production jobs.

Please mention The BLUE BOOK in writing for further information.

Hamilton Special-Purpose Machines

The Hamilton Tool Company, Hamilton, Ohio, has recently designed a small dieing machine for blanking and forming paper clips of foil $\frac{3}{4}$ -inch wide x .003-inch thick. The machine is 14 inches long, six inches wide and 13



inches high. For information on this or other special-purpose tools or machinery, write to the manufacturer, mentioning The BLUE BOOK.

COLUMBIA'S



JFS-JR. VARI-SPEED CONTROLS

Speed Control is vital to efficient production. Use this simplest and most practical variable speed transmission ever offered to industry. Standard V belts used—5-1 speed ratio—fractional to $7\frac{1}{2}$ HP—and low in cost.

Write today for further particulars.

COLUMBIA VARI-SPEED CO., Wheaton, Ill.

Buyers' Directory

Milling Attachments

Bridgeport Pattern & Model Works, Bridgeport, Conn.

Burke Machine Tool Co., Conneaut, Ohio
Wm. Carroll & Son, Norwood, Cincinnati, Ohio
Dalrae Tools Company, Syracuse, N. Y.
Kearney & Trecker Corp., Milwaukee, Wis.

Milling Machine Live Centers

Motor Tool Mfg. Co., Detroit, Mich.

Milling Machines, Bench

Burke Machine Tool Co., Conneaut, Ohio
Hardinge Brothers, Inc., Elmira, N. Y.
Sundstrand Machine Tool Co., Rockford, Ill.

Milling Machines, Hand

Burke Machine Tool Co., Conneaut, Ohio
Sundstrand Machine Tool Co., Rockford, Ill.

Milling Machines, Plain

Burke Machine Tool Co., Conneaut, Ohio
Kearney & Trecker Corp., Milwaukee, Wis.
Sundstrand Machine Tool Co., Rockford, Ill.

Milling Machines, Universal

Brown & Sharpe Mfg. Co., Providence, R. I.
Gorton Machine Co., Geo., Racine, Wis.
Kearney & Trecker Corp., Milwaukee, Wis.

Milling Machines, Vertical

Blank & Buxton Mch. Co., Jackson, Mich.
Gilman Eng. Works, Janesville, Wis.
Gorton Machine Co., Geo., Racine, Wis.
Kearney & Trecker Corp., Milwaukee, Wis.

Motors

Janette Mfg. Co., 552 W. Monroe St., Chicago

Motor-Generator Sets

Chicago Electric Co., 1330 W. Cermak Rd., Chgo.
Janette Mfg. Co., 552 W. Monroe St., Chicago

Motor Drives, Universal

Berkeley Engineering Co., Cleveland, Ohio
Culman Wheel Co., 1359 Altgeld St., Chicago
Powermaster, 25 E. Fourth St., New York, N. Y.
Remco Products Corp., 110 S. Dearborn St., Chicago, Ill.

Steege Machinery Co., 548 W. Monroe St., Chicago, Ill.

Turner Uni-Drive Co., Kansas City, Mo.

Moulds & Ladles, Hammer and Vise

Johnson Tool Co., East Providence, R. I.

Multiple Oilers

Gita Bros. Mfg. Co., 1800 S. Kilbourn, Chicago

Nails

Hassall, John, Inc., Brooklyn, N. Y.

Nibbling Machines

National Machine Tool Co., Racine, Wis.

Oil Cups

Gita Bros. Mfg. Co., 1800 S. Kilbourn, Chicago

Oil Gauges

Gita Bros. Mfg. Co., 1800 S. Kilbourn, Chicago

Oil and Grease Seals

Gita Bros. Mfg. Co., 1800 S. Kilbourn, Chicago

Oilers, Automatic

Trico Fuse Mfg. Co., Milwaukee, Wis.

Parallels

Ford Motor Co., Johansson Div., Dearborn, Mich.

Patternmakers Tools

Hoover Tool Co., Anderson, Ind.

Pins, Leader and Dowel

Acme Industrial Co., 210 Laflin St., Chicago, Ill.
Baumbach Mfg. Co., E. A., 1812 So. Kilbourn Ave., Chicago, Ill.

Pipe Cutters

Ridge Tool Co., Elyria, Ohio

Pipe Vises

Ridge Tool Co., Elyria, Ohio

Pipe Wrenches

Ridge Tool Co., Elyria, Ohio

Plates, Surface and Bench

Master Tapper Company, Belleville, N. J.

Pliers, Toggle

Knu-Vise Products Co., Detroit, Mich.

Point Thinning Machines

Oliver Instrument Co., Adrian, Mich.

Power Devices, Air-hydraulic

Logansport Machine, Inc., Logansport, Ind.

Press Brakes

Dreis & Krump Mfg. Co., 7440 Loomis Blvd., Chicago, Ill.

Verson Allsteel Press Co., 9303 S. Kenwood Ave., Chicago, Ill.

Ward Machinery Co., 564 W. Washington, Chicago, Ill.

Press Feeds

Littell Machine Co., F. J., 4153 Ravenswood Ave., Chicago, Ill.

Wittek Mfg. Co., 4309 W. 24th Place, Chicago

Presses, Arbor

Atlas Press Co., Kalamazoo, Mich.
Fanco Machine Co., Racine, Wis.
Greenerd Arbor Press Co., Nashua, N. H.
Hanna Engineering Works, 1763 Elston, Chicago
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chgo.
W. H. Nicholson & Co., Wilkes-Barre, Pa.
Tomkins-Johnson Co., Jackson, Mich.
Wilson, K. H., Buffalo, N. Y.

Presses, Bench

Atlas Press Co., Kalamazoo, Mich.
Greenerd Arbor Press Co., Nashua, N. H.
Loshbough-Jordan Tool & Mch. Co., Elkhart, Ind.

Presses, Broaching

Greenerd Arbor Press Co., Nashua, N. H.

Presses, Foot

Fanco Machine Co., Racine, Wis.
Ward Machinery Co., 564 W. Washington, Chicago, Ill.

Presses, Forming

Marshalltown Mfg. Co., Marshalltown, Ia.

Presses, Hydraulic

Atlas Press Co., Kalamazoo, Mich.
Greenerd Arbor Press Co., Nashua, N. H.
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chgo.

Presses, Inclined

Federal Press Co., Elkhart, Indiana.
Loshbough-Jordan Tool & Mch. Co., Elkhart, Ind.
Marshalltown Mfg. Co., Marshalltown, Ia.
Ross Co., David J., Benton Harbor, Mich.

Presses, Power

Dreis & Krump Mfg. Co., 7440 Loomis Blvd., Chicago, Ill.

Federal Press Co., Elkhart, Indiana

Verson Allsteel Press Co., 9303 S. Kenwood Ave., Chicago, Ill.

Presses, Punch

Dreis & Krump Mfg. Co., 7440 Loomis Blvd., Chicago, Ill.

Lewthwaite Machine Co., 311 E. 47th St., New York, N. Y.

Marshalltown Mfg. Co., Marshalltown, Ia.

Ross Co., David J., Benton Harbor, Mich.

Presses, Sheet Metal

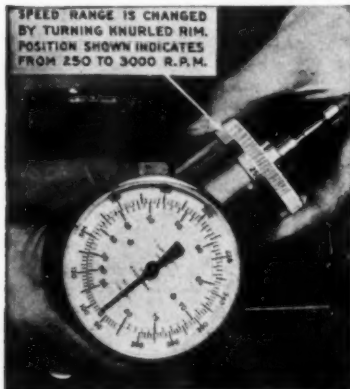
Federal Press Co., Elkhart, Indiana

Presses, Steel

Verson Allsteel Press Co., 9303 S. Kenwood Ave., Chicago, Ill.

Scherr Announces the "S & S" Tachometer

The George Scherr Co., offers a universal hand tachometer especially designed for plants that need to measure speeds over a wide range.



The model known as the "S & S" Jewelled Hand Tachometer contains eight jewels, an improvement said to add to the life of the bearings, reduce repair costs and guarantee accuracy at the high speeds for which the instrument may be used.

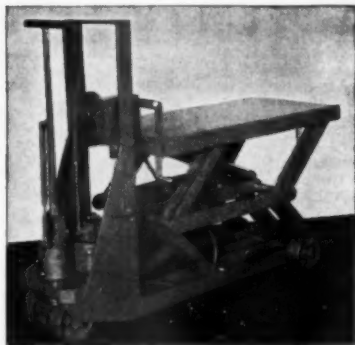
The tachometer is manufactured in two models, one measuring from 30 to 40,000 r.p.m., and the other from 25 to 30,000 r.p.m. The pointer makes two turns around the dial giving read-

ings on two sets of numerals, one for the inside scale graduations and the other for the outside. Tachometer operates on the centrifugal principle. Ranges are from 30 to 400, 300 to 4000, 3000 to 40,000 on one model and 25 to 300, 250 to 3000, 2500 to 30,000 on the other model.

It may be used for motors, engines, shafts and spindles, looms and turbines, for textile, paper and power plants. The tachometer comes complete, with standard accessories. Distributed by the George Scherr Co., 128 Lafayette St., New York, N. Y.

Lyon Truck with Hydraulic Elevating Table

This type truck with hydraulic elevating table, developed by Lyon Iron



Works, Greene, N. Y., has found many uses. One of these uses is handling

WIDEST USED IN U. S.

Upkeep practically nothing; no oiling; no supervision. Lasts indefinitely; first cost very moderate.

Send us R.P.M. HP and Shaft Dia.



PATENTED

**L-R
FLEXIBLE
COUPLING
Type 1A**

for a test sample ($\frac{3}{8}$ " to $2\frac{1}{4}$ "), with which you can check its ability to absorb shock and correct misalignments. Write

**LOVEJOY FLEXIBLE
COUPLING CO.**

6828 W. Lake St., Chicago, Ill.

Drill Grinding Attachment

fits Black & Decker and Van Dorn grinders, sharpens twist drills correctly. Price only \$18.

C. H. Carlson Mfg. Co.
13-15 Main St., N. E.
Minneapolis, Minn.

Write for
bulletin



Buyers' Directory

Profiling Machines

Gorton Machine Co., Geo., Racine, Wis.
Oliver Instrument Co., Adrian, Mich.

Pulleys, Die Cast

Chicago Die Cast. Mfg. Co., 2502 W. Monroe, Chicago.

Pulleys, Steel and Wood

Delta Mfg. Co., Milwaukee, Wis.

Pumps

Brown & Sharpe Mfg. Co., Providence, R. I.
Galland-Henning Mfg. Co., Milwaukee, Wis.

Pumps, Centrifugal

Logansport Machine, Inc., Logansport, Ind.

Pumps, Coolant

Ruthman Machinery Co., Cincinnati, Ohio
Tomkins-Johnson Co., Jackson, Mich.

Pumps, Diesel Fuel Injection

Ex-Cell-O Corp., Detroit, Mich.

Pumps, Lubricant

Ruthman Machinery Co., Cincinnati, Ohio

Punch, Shear and Bender, Hand

Armstrong-Blum Mfg. Co., 5741 Bloomingdale Ave., Chicago, Ill.
Buffalo Forge Co., Buffalo, N. Y.

Punch Press Guards

Rosa Co., David J., Benton Harbor, Mich.

Punches and Dies

Lewthwaite Machine Co., 311 E. 47th St., New York, N. Y.

Punches, Hand

Armstrong-Blum Mfg. Co., 5741 Bloomingdale Ave., Chicago, Ill.
Buffalo Forge Company, Buffalo, N. Y.
Lewthwaite Machine Co., 311 E. 47th St., New York, N. Y.
Sampson Tool Co., 101 Walker St., New York
Ward Machinery Co., 504 W. Washington, Chicago, Ill.
Whitney Metal Tool Co., Rockford, Ill.

Quick Change Collets & Chucks

Jarvis Co., Charles L., Middletown, Conn.

Racks, Bar Stock

Western Tool & Mfg. Co., Springfield, Ohio
Win. S. Yohs Supply Co., Canton, Ohio

Reamers

Glenzer Co., J. C., Detroit, Mich.

Rivets

Hassal, John, Inc., Brooklyn, N. Y.

Rivets, Tubular and Split

Chicago Rivet & Machine Co., 1855 S. 54th St., Cicero, P. O. Chicago, Ill.

Riveters, Automatic Feed

Chicago Rivet & Machine Co., 1855 S. 54th St., Cicero, P. O. Chicago, Ill.
Tomkins-Johnson Co., Jackson, Mich.

Riveters, "Hy-Power" Hydraulic

Hannifin Mfg. Co., 621 S. Kolmar Ave., Chgo.

Riveters, Multiple Spindle

Grant Mfg. & Machine Co., Bridgeport, Conn.

Riveters, Pneumatic

Grant Mfg. & Machine Co., Bridgeport, Conn.
Hanna Engineering Works, 1763 Elston Ave., Chicago, Ill.
Hannifin Mfg. Co., 621 S. Kolmar Ave., Chgo.

Riveting Machines

Buffalo Forge Co., Buffalo, N. Y.
Grant Mfg. & Machine Co., Bridgeport, Conn.
Hanna Engineering Works, 1763 Elston Ave., Chicago, Ill.

Riveting Machines, Tubular and Split

Chicago Rivet & Machine Co., 1855 S. 54th St., Cicero, P. O. Chicago, Ill.

Rod Cutters

Armstrong-Blum Mfg. Co., 5741 Bloomingdale Ave., Chicago, Ill.
Lewthwaite Machine Co., 311 E. 47th St., New York, N. Y.

Rotary Converters

Janette Mfg. Co., 556 W. Monroe St., Chicago

Rotary Files

Ford Mfg. Co., M. A., Davenport, Iowa
Grobet File Corp. of America, 3 Park Place, New York, N. Y.
Hamilton Tool Co., Hamilton, Ohio
Jarvis Co., Charles L., Middletown, Conn.
Pratt & Whitney Div., Hartford, Conn.

Router Bits

American Rotary Tools Co., 44 Whitehall St., New York, N. Y.
Putnam Tool Co., Detroit, Mich.

Sanders

Jarvis Co., Charles L., Middletown, Conn.
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
Stanley Electric Tool Div., New Britain, Conn.

Saws

Black Diamond Saw & Machine Works, Inc., Natick, Mass.

Saws, Electric Hand

Delta Mfg. Co., Milwaukee, Wis.
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
Stanley Electric Tool Div., New Britain, Conn.

Saws, Metal Cutting

Racine Tool & Mch. Co., Racine, Wis.

Saws, Rotary Hack

Stanley Electric Tool Div., New Britain, Conn.

Saw Sharpening Machines

Wardwell Manufacturing Co., Cleveland, Ohio

Sawing Machines

Continental Machine Specialties, Minneapolis
Delta Mfg. Co., Milwaukee, Wis.
Grob Brothers, Grafton, Wis.

Scraping Machines, Hand & Pneumatic

Anderson Bros. Mfg. Co., Rockford, Ill.

Screw Drivers, Electric

Haskins Co., R. G., 623 S. California, Chicago.
Jarvis Co., Charles L., Middletown, Conn.
Stanley Electric Tool Div., New Britain, Conn.
Stow Manufacturing Company, Binghamton, N. Y.

Screw Machine Parts

Modern Collet & Machine Co., Ecorse, Mich.
Sutton Tool Company, Detroit, Mich.

sheet metal for shears, presses, and punches, enabling the operator to have the sheets at a convenient height for feeding into these machines. Other uses are handling heavy rolls in and out of rolling machines and handling dies in and out of presses. The truck shown in the illustration was designed particularly for the latter purpose. This table is operated by a lever arrangement and hydraulic cylinders. For furnishing power to the cylinders, a two-speed hand-operated hydraulic pump is used, automatically elevating an empty table at a speed twice that of a loaded table.

For details concerning the truck, mention **THE BLUE BOOK** in a letter to the manufacturer.

New Rotor Impact Clutches

The Rotor Tool Company, Cleveland, Ohio announces a new group of adjustable impact clutches, applied to air nut setters and screw drivers ranging in capacity from $\frac{1}{4}$ " to $\frac{3}{4}$ ".

The new Rotor clutches apply the impact principle to screw driving and nut setting. This increases the turning effort of the clutch so that it is greatly in excess of the torque supplied by the motor. First, the torque of the motor drives the nut down, then the triple action clutch giving three impacts per revolution sets the nut to a pre-determined tension. The torque at which the nut is set and the clutch released is governed by an adjustable spring. The operation is rapid and without shock to the operator.

The impact members of the clutch, as shown in the drawing, consist of three steel balls which serve as drivers and carry the load. These run in three equally spaced raceways in the upper clutch half which contains three interruptions, all of hardened steel. The clutch housing (not shown) is bronze. Standard balls are used which are quickly and cheaply replaceable, and the expense of regrounding chuck jaws on the conventional type of clutch is thus avoided. An auxiliary, spring-

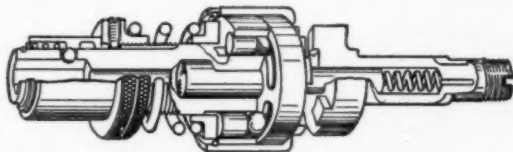
opened clutch keeps the nut socket stationary when starting or idling until pressure is applied to the tool.

The manufacturer claims that the work output of the new clutches is greatly in excess of that heretofore associated with light-weight tools, and that the triple action impact clutches give uniform tension to the nuts and screws on the assembly line without reaction to the operator. Nut setters are available in larger sizes up to $\frac{3}{4}$ " with spade handle or with side handles, with complete accessories such as extension socket wrench driver, universal joints, and Phillips screw driver bits.

In writing for further information your mention of **THE BLUE BOOK** will be appreciated.

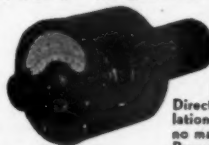
Kennametal Catalog

McKenna Metals Co., 135 Lloyd Ave., Latrobe, Pa., manufacturers of "Kennametal" tools and blanks for steel and metal cutting, has issued a new 24-page catalog which is now



available to all plant operating and purchasing officials. Kennametal is manufactured in three grades—hard, medium and soft alloys, and designated as KH, KM and KS, depending on the metals to be cut. Grade KH is

PYRO Radiation Pyrometer



STOP spoilage by getting the exact temperature of the work in the furnace—not merely the heat of the furnace. Direct reading; no calculations; no installation; no maintenance expense. Range 1000–3600° F.

Send for bulletin No. 100.

THE PYROMETER INSTRUMENT CO.
102-105 Lafayette St., New York

Buyers' Directory

- Screw Machine Products**
Economy Machine Products Co., 5207 Lawrence Ave., Chicago, Ill.
- Screw Machines, Automatic**
Brown & Sharpe Mfg. Co., Providence, R. I.
- Screws**
Hassal, John, Inc., Brooklyn, N. Y.
- Scribers**
Ford Motor Co., Johansson Div., Dearborn, Mich.
Starrett Co., L. S., Athol, Mass.
- Set Screws, Headless and Hollow**
Economy Machine Products Co., 5207 Lawrence Ave., Chicago, Ill.
Safety Socket Screw Corp., 4440 N. Knox Ave., Chicago, Ill.
Standard Pressed Steel Co., Jenkintown, Pa.
Triplex Screw Co., Cleveland, Ohio
- Set-Up Appliances**
Standard Shop Equipment Co., Inc., Phila., Pa.
- Shafts, Flexible**
Haskins Co., R. G., 623 S. California, Chicago.
Jarvis Co., Charles L., Middletown, Conn.
Mall Tool Co., 7742 S. Chicago Ave., Chicago, Ill.
Pratt & Whitney, Hartford, Conn.
Stow Manufacturing Company, Binghamton, N. Y.
Strand Co., S. A., 5601 N. Wolcott St., Chicago
- Shafts, Hangers & Boxes**
Delta Mfg. Co., Milwaukee, Wis.
- Shapers**
Atlas Press Co., Kalamazoo, Mich.
- Shaping Machines**
Osborne & Sexton Machinery Co., Columbus, O.
- Shears, Bevel**
Marshalltown Mfg. Co., Marshalltown, Ia.
Ward Machinery Co., 564 W. Washington, Chicago, Ill.
- Shears, Electric**
Ward Machinery Co., 564 W. Washington, Chicago, Ill.
- Shears, Hand**
Armstrong-Blum Mfg. Co., 5741 Bloomingdale Ave., Chicago, Ill.
Beverly Shear Co., 3007 W. 110th Pl., Chicago
Lewthwaite Machine Co., 311 E. 47th St., New York, N. Y.
National Machine Tool Co., Racine, Wis.
Whitney Metal Tool Co., Rockford, Ill.
- Shears, Power**
Buffalo Forge Co., Buffalo, N. Y.
Dreis & Krump Mfg. Co., 7440 Loomis, Chicago
Stanley Electric Tool Div., New Britain, Conn.
Ward Machinery Co., 564 W. Washington, Chicago, Ill.
- Shears, Slitting**
Beverly Shear Co., 3007 W. 110th Pl., Chicago
Buffalo Forge Co., Buffalo, N. Y.
Dreis & Krump Mfg. Co., 7400 Loomis, Chicago
National Machine Tool Co., Racine, Wis.
- Shears, Splitting**
Marshalltown Mfg. Co., Marshalltown, Ia.
- Shears, Throatless**
Beverly Shear Co., 3007 W. 110th Pl., Chicago
Marshalltown Mfg. Co., Marshalltown, Ia.
- Sheet Metal Working Machinery**
Ward Machinery Co., 564 W. Washington, Chicago, Ill.
- Shelving, Steel**
Interior Steel Equipment Co., Cleveland, Ohio
- Shop Lights**
Vimco Mfg. Co., Buffalo, N. Y.
Zagora Mch. & Gear Co., J., Charlotte, N. C.
- Sine Bars**
Ford Motor Co., Johansson Div., Dearborn, Mich.
- Sine Tables**
Robbins Company, Omer E., Detroit, Mich.
- Sleeves**
Glenzer Company, J. C., Detroit, Mich.
- Socket Head Cap Screws**
Economy Machine Products Co., 5207 Lawrence Ave., Chicago, Ill.
- Safety Socket Screw Corp., 4440 N. Knox Ave., Chicago, Ill.**
Standard Pressed Steel Co., Jenkintown, Pa.
- Soldering Tools, Electric**
Ideal Commutator Dresser Co., Sycamore, Ill.
- Spacing Collars**
Scully-Jones & Co., 1905 S. Rockwell St., Chicago, Ill.
- Special Tools and Machinery**
American Tool Works, Inc., Hartford, Conn.
- Speed Reducers**
Abart Gear & Mch. Co., 4832 W. 16th St., Chgo.
Armiglo Co., Milwaukee, Wis.
Chicago Gear Works, 769 W. Jackson Blvd., Chicago, Ill.
Cullman Wheel Co., 1359 Altgeld St., Chicago
Janette Mfg. Co., 552 W. Monroe St., Chicago
- Speed Saws, Universal**
Wyzenbeck & Staff, Inc., 838 W. Hubbard, Chgo.
- Spools & Nuts for Auto. Screw Machines**
Sutton Tool Co., Detroit, Mich.
- Split Rivets**
Chicago Rivet & Machine Co., 1855 S. 54th St., Cicero, P. O. Chicago, Ill.
- Split Rivet Setters, Automatic Feed**
Chicago Rivet & Machine Co., 1855 S. 54th St., Cicero, P. O. Chicago, Ill.
- Spot Welding Machines, Speed**
Armiglo Co., Milwaukee, Wis.
Eisler Engineering Co., Inc., Newark, N. J.
Interstate Machinery Co., Chicago, Ill.
Pier Equipment Mfg. Co., Benton Harbor, Mich.
- Sprockets**
Cullman Wheel Co., 1359 Altgeld St., Chicago
- Stake Riveters**
Marshalltown Mfg. Co., Marshalltown, Ia.
- Stampings**
Hamilton Tool Co., Hamilton, Ohio
- Steel**
Ryerson & Son, Jos. T., 16th & Rockwell, Chgo.
- Steel Stamps**
Colonial Bushings Co., Detroit, Mich.
- Stools, Shop**
Standard Pressed Steel Co., Jenkintown, Pa.
- Stop Watches**
Meylan, A. R. & J. E., 266 W. 40th St., N.Y.C.
- Storage Racks**
Interior Steel Equipment Co., Cleveland, Ohio
Stackbin Corp., Providence, R. I.
Yohe Supply Co., Canton, Ohio
- Straightening Machines**
Whitney Metal Tool Co., Rockford, Ill.
- Stripping Units**
Strippit Corp., Buffalo, N. Y.
- Stud Setters**
Apex Machine Co., Dayton, Ohio
- Studs, Millid**
Safety Socket Screw Corp., 4440 N. Knox Ave., Chicago, Ill.
- Tables, Drawing**
Hamilton Mfg. Co., Two Rivers, Wis.
- Tables, Sine**
Robbins Company, Omer E., Detroit, Mich.
- Tap Extractors**
Walton Co., Hartford, Conn.

the most generally applied grade where only one kind of hard carbide is used, as it machines not only steel, but non-ferrous alloys, and malleable iron as well as taking interrupted cuts on cast iron.

The basic ingredient of the steel-cutting grades of Kennametal, a synthetic tungsten titanium carbide composition, is the new substance corresponding to the chemical formula $WTiC_2$ which was developed by Philip M. McKenna. The main use of this compound at present is as an ingredient in the manufacture of hard carbide alloys in the form of blanks for tool tips, drawing dies, lathe centers, gage parts, rings, balls, rolls and other shapes, all harder than any tool steel. Kennametal tool blanks are brazed to steel shanks with copper or bronze to make tools for turning, boring, facing, milling, keyway cutting, reaming, etc., of steel articles, both annealed, and heat-treated up to 500 Brinell, monel metal, malleable iron, cast iron, brass, bronze and aluminum.

Copies of this new catalog may be obtained gratis by addressing the manufacturer. Ask for Kennametal No. 2 Catalog, and please mention The BLUE BOOK.

The New Ammco Tension Indicator

The Automotive Maintenance Machinery Co., North Chicago, Ill., has attacked the problem of tightening bolts to a predetermined stress, so that each bolt will carry its designated portion of the total load, with a new tension indicating wrench. The new wrench finds its widest application in bolting or tightening cylinder heads, flange connections, main bearing supports, connecting rods, and other parts where constant control must be maintained over steam, gas, water, oil, or

air.

It is available in three sizes, 1-F with a capacity of 175 ft.-lbs., 2-F with a capacity of 420 ft.-lbs., and 3-F, having a capacity of 1000 ft.-lbs.



The new tool is said to represent a great advance over the methods of determining bolt stresses by elongation and torque. It can be taken into the field or into the shop, as it need not have laboratory surroundings. It is said to prevent distortion, insure accuracy, and maintain tight seals in machines. Information on the wrench may be had by addressing the manufacturer, mentioning The BLUE BOOK.

Industrial "Locklite" Lighting Unit

An ingenious new "Locklite" principle of attaching industrial reflectors, which speeds installation, reduces maintenance and provides increased safety with interchangeability of reflector units, is announced by the Lighting Division of the Westinghouse Electric & Mfg. Co., Edgewater Park, Cleveland, Ohio.

Buyers' Directory

Tap Holders

Procurer Safety Chuck Co., 14 S. Clinton St., Chicago, Ill.
Scully-Jones & Co., 1905 S. Rockwell St., Chicago, Ill.

Tapes, Steel

Starrett Co., L. S., Athol, Mass.

Tapping Machines and Attachments

Burke Machine Tool Co., Connecticut, Ohio
Errington Mechanical Laboratories, Staten Island, N. Y.
Etico Tool Co., 594 Johnson Ave., Brooklyn, N. Y.
Haskins Company, R. G., 623 S. California Ave., Chicago, Ill.
Jarvis Co., Charles L., Middletown, Conn.
Master Tapper Company, Belleville, N. J.
Procurer Safety Chuck Co., 14 So. Clinton St., Chicago, Ill.
Whitney Metal Tool Co., Rockford, Ill.

Thread Grinders

Ex-Cell-O Corp., Detroit, Mich.

Threading Machines, Automatic

Grant Mfg. & Machine Co., Bridgeport, Conn.

Threading Tools

Armstrong Bros. Tool Co., 308 N. Francisco Ave., Chicago, Ill.
Ridge Tool Co., Elyria, Ohio
Rivett Lathe & Grinder, Inc., Brighton, Boston

Timing Instruments

Meylan, A. R. & J. E., 206 W. 40th St., N. Y. C.

Tool Holders

Armstrong Bros. Tool Co., 308 N. Francisco Ave., Chicago, Ill.
Michigan Tool Co., Detroit, Mich.
Rigid Tool Holder Co., Detroit, Mich.
Western Tool & Mfg. Co., Springfield, Ohio

Tool Post Turrets

Colwell, S. G., Providence, R. I.

Tool Reclaiming

Machinists Tool Grinding Co., 2834 W. Lake St., Chicago, Ill.

Toolroom Machinery, Combination

Gilman Eng. Works, Janesville, Wis.

Tools, Boring

Armstrong Bros. Tool Co., 308 N. Francisco Ave., Chicago, Ill.
Comet Tools, Inc., 39 Union Square, New York
Gairing Tool Co., Detroit, Mich.

Tools, Cutting

Carboly Co., Detroit, Mich.

Tools, Filing

Hoover Tool Co., Anderson, Ind.

Tools, Lathes and Planer

Armstrong Bros. Tool Co., 308 N. Francisco Ave., Chicago, Ill.

Tools, Machinists'

Armstrong Bros. Tool Co., 308 N. Francisco Ave., Chicago, Ill.
Brown & Sharpe Mfg. Co., Providence, R. I.

Tools, Multidiameter

Gairing Tool Co., Detroit, Mich.

Tools, Sawing

Hoover Tool Co., Anderson, Ind.

Tools, Special

Ex-Cell-O Corp., Detroit, Mich.

Torch, Pumps Gasoline

Baumgarth Mfg. Co., 836 Hubbard St., Chicago.

Tracing Sheets

Wade Instrument Co., Cleveland, Ohio.

Tram Points

Ford Motor Co., Johanson Div., Dearborn, Mich.

Transmissions, Variable Speed

Ideal Commutator Dresser Co., Sycamore, Ill.
Lenney Machine & Mfg. Co., Warren, Ohio

Tube Flanging Machines

Grant Mfg. & Mche. Co., Bridgeport, Conn.

Tubular Rivet Setters, Automatic Feed

Chicago Rivet & Machine Co., 1855 S. 54th St., Cicero, P. O. Chicago, Ill.

Tungsten Carbide Tools

Michigan Tool Co., Detroit, Mich.
Willey's Carbide Tool Co., Detroit, Mich.

Turning Tools

R & L Tools, Philadelphia, Pa.

Universal Joints

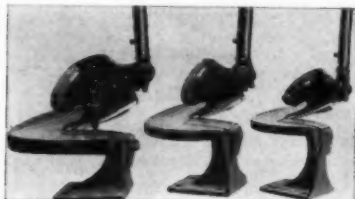
American Tool Works, Inc., Hartford, Conn.

Used and Rebuilt Machinery

Aaron Machinery Co., 176 Lafayette St., N. Y.
Belyea Company, Jersey City, N. J.
Bennet-Rafkin Machine Tool Corp., 30 Church St., New York, N. Y.
Bernstein & Co., Geo. M., 12 S. Clinton, Chgo.
Bleser Mfg. & Mchy. Co., Springfield, Ill.
Botwinik Brothers, Inc., New Haven, Conn.
Brown Machinery Co., St. Louis, Mo.
Cincinnati Machy. & Supply Co., Cincinnati, O.
Clinton Machinery Co., 33 S. Clinton St., Chicago
Dean Co., R. S., 642 W. Wash., Chicago.
Denny & Clark, 910 N. Marshallfield, Chicago.
Eastern Machinery Co., Cincinnati, Ohio
Egan Co., Dallas, Tex.
Emerman, Louis E. & Co., 1761 Elston, Chicago
Easley Machinery Co., E. L., 831 W. Evergreen Ave., Chicago, Ill.
Falk Mill Supply Co., Inc., Rochester, N. Y.
General Blower Co., 401 N. Peoria St., Chicago
George, James W., Detroit, Mich.
Hill, Clarke & Co., 645 W. Washington, Chgo.
Hyman & Sons, Joseph, Philadelphia, Pa.
Indianapolis Mchry. & Supply Co., Indianapolis
Industrial Machinery Co., Indianapolis, Ind.
Inland Machinery Co., 41 S. Clinton, Chicago.
International Machinery Co., Detroit, Mich.
Interstate Machinery Co., 109 S. Clinton, Chgo.
Iroquois Machinery Co., Buffalo, N. Y.
Johnson & Sons Mchy. Co., Wm. C., St. Louis
Jones Machine Tool Co., Cincinnati, Ohio
Klauber Machinery Co., St. Louis, Mo.
Lake Machinery Co., 656 W. Lake, Chicago.
Lang Machinery Co., Pittsburgh, Pa.
McDonald Machinery Co., St. Louis, Mo.
Marr-Galbreath Mchy. Co., Pittsburgh, Pa.
Midwest Equipment Co., 628 W. Lake, Chicago
Miles Machinery Co., 2025 Genesee Ave., Saginaw, Mich.
Modern Machinery Co., 243 Centre St., New York, N. Y.
Morey Machinery Co., Inc., 410 Broome St., New York, N. Y.
Morris Machinery Company, Inc., Newark, N. J.
Nelson Machinery Co., Green Bay, Wis.
Norton-Broadway Machinery Co., Cincinnati, O.
O'Brien Machinery Co., Philadelphia, Pa.
Osborne & Sexton Machinery Co., Columbus, O.
Ott Machinery Sales Co., Detroit, Mich.
Reliance Machinery Sales Co., Pittsburgh, Pa.
Reynolds Machinery, Providence, R. I.
Rich Ladder & Mfg. Co., Cincinnati, O.

New Beverly Heavy Duty Shear

A new addition to the Beverly line of metal shears has been announced by the Beverly Shear Co., 3009 W. 110th Place, Chicago. It is designed to handle mild steel in thicknesses up to 3/16 inch and stainless steel as heavy as 10 gauge.



A bench type, hand powered shear, it weighs 55 lbs. and takes nine inches of bench space. Power is applied to the 14-inch blade through a rack and

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1. Simplicity and sturdiness adapt this center to heavy duty with extra long life.
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Inset photograph shows Universal Superfinish bore. The exceptional wearing qualities of the combined carbon and nitrogen case—is further improved by honing the bore to a Superfinish. The black dome is a distinctive Universal feature which will add to the appearance of your tools. Write for data sheet TODAY.

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Buyers' Directory

Used and Rebuilt Machinery—Cont.

Rosenkrans & Welsbecker, 2309-A Singer Bldg., New York City
 Royal Machinery Exchange, 401 Broome St., New York, N. Y.
 Scott-Hansbach Mch. Co., 4607 W. 20th, Chgo.
 Segal Machinery Co., 117 S. Clinton St., Chicago
 Service Co., Cleveland, Ohio
 Simmons Machine Tool Corp., Albany, N. Y.
 Smith Mch. Co., E. W., Columbus, Ohio.
 Standard Machinery Co., Grand Rapids, Mich.
 Strong, Carlisle & Hammond Co., Cleveland, O.
 Surplus Material & Machinery Co., Detroit, Mich.
 Surplus Stock & Mch. Co., Inc., 618 W. Lake St., Chicago, Ill.
 Turner Mch. Co., Kansas City, Mo.
 United Machinery & Supply Co., St. Louis, Mo.
 Victor Machinery Co., 130 S. Clinton, Chicago
 Victor Machinery Exchange, 251 Centre St., New York, N. Y.
 Vine, R. A., Detroit, Mich.
 West Penn Machinery Co., Pittsburgh, Pa.
 White Mch. Co., A. D., 108 N. Jefferson, Chgo.
 Wigglesworth Machinery Co., Cambridge, Mass.
 Wolnick Mch. Co., H. F., 9 S. Clinton, Chicago.

Vacuum Cleaners, Industrial

Breuer Elec. Mfg. Co., 5108 N. Ravenswood, Chicago

Vacuum Cleaners, Portable

Breuer Elec. Mfg. Co., 5108 N. Ravenswood, Chicago

Valves, Air

Air-Way Pump & Equipment Co., 617 W. Jackson, Chicago, Ill.
 Berkeley Engineering Co., Cleveland, Ohio
 Galland-Henning Mfg. Co., Milwaukee, Wis.
 Hanna Engineering Works, 1763 Elston, Chicago
 Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago
 Logansport Machine, Inc., Logansport, Ind.
 Nicholson & Co., Wilkes-Barre, Penna.
 Ross Operating Valve Co., Detroit, Mich.
 Tomkins-Johnson Co., Jackson, Mich.

Valves

Berkeley Engineering Co., Cleveland, Ohio
 Galland-Henning Mfg. Co., Milwaukee, Wis.
 Hanna Engineering Works, 1763 Elston, Chicago
 Ross Operating Valve Co., Detroit, Mich.

Valves, Foot, Lever & Solenoid

Berkeley Engineering Co., Cleveland, Ohio
 Hanna Engineering Works, 1763 Elston, Chicago
 Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago
 Nicholson & Co., W. H., Wilkes-Barre, Pa.
 Ross Operating Valve Co., Detroit, Mich.

Valves, Hydraulic

Berkeley Engineering Co., Cleveland, Ohio
 Galland-Henning Mfg. Co., Milwaukee, Wis.
 Hanna Engineering Works, 1763 Elston, Chicago
 Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago
 Nicholson & Co., Wilkes-Barre, Penna.

Valves, Operating

Berkeley Engineering Co., Cleveland, Ohio
 Galland-Henning Mfg. Co., Milwaukee, Wis.
 Hanna Engineering Works, 1763 Elston, Chicago
 Hannifin Mfg. Co., 621 S. Kolmar Ave., Chicago
 Ross Operating Valve Co., Detroit, Mich.

Vises, Drilling Machine

Armstrong-Blum Mfg. Co., 5741 Bloomingdale Ave., Chicago, Ill.
 Armstrong Bros. Tool Co., 308 N. Francisco Av., Chicago, Ill.
 Johnson Tool Co., Inc., East Providence, R. I.
 L-W Chuck Co., Toledo, Ohio
 Modern Machine Tool Co., Jackson, Mich.
 National Machine Tool Co., Racine, Wis.

Odin Universal Corp., 110 S. Dearborn, Chicago
 Plunket Machine Co., 1823 W. Lake St., Chicago
 Sampson Tool Co., 161 Walker St., New York
 Yost Mfg. Co., Meadville, Pa.

Vises, Machinists'

Diamond-Stephan Mfg. Co., Urbana, Ohio
 L-W Chuck Co., Toledo, Ohio
 Odin Universal Corp., 110 S. Dearborn, Chicago
 Western Tool & Mfg. Co., Springfield, Ohio
 Yost Mfg. Co., Meadville, Pa.

Vises, Milling Machine

Hartford Special Mch. Co., Hartford, Conn.
 Knu-Vise Products Co., Detroit, Mich.
 L-W Chuck Co., Toledo, Ohio
 Odin Universal Corp., 110 S. Dearborn, Chicago
 Plunket Machine Co., 1823 W. Lake St., Chicago
 Yost Mfg. Co., Meadville, Pa.

Vises, Precision

Odin Universal Corp., 110 S. Dearborn, Chicago

Vises, Shaper

L-W Chuck Co., Toledo, Ohio
 Odin Universal Corp., 110 S. Dearborn, Chicago
 Plunket Machine Co., 1823 W. Lake St., Chicago

Vises, Special

Modern Machine Tool Co., Jackson, Mich.

Welders, Arc

Chicago Electric Co., 1330 W. Cermak Rd., Chgo.
 Hobart Brothers, Troy, Ohio
 Pier Equipment Mfg. Co., Benton Harbor, Mich.

Welders, Portable

Chicago Electric Co., 1330 W. Cermak Rd., Chgo.
 Hobart Brothers, Troy, Ohio

Welding Accessories

Hobart Brothers, Troy, Ohio

Welding Electrodes and Holders

Hobart Brothers, Troy, Ohio

Welding Generators, Arc

Chicago Electric Co., 1330 W. Cermak Rd., Chgo.
 Hobart Brothers, Troy, Ohio

Welding Machines, Electric Spot

Armco Co., Milwaukee, Wis.
 Eisler Engineering Co., Inc., Newark, N. J.
 Interstate Machinery Co., Chicago, Ill.
 Lenney Machine & Mfg. Co., Warren, Ohio
 Pier Equipment Mfg. Co., Benton Harbor, Mich.
 Ward Machinery Co., 564 W. Washington, Chicago, Ill.

Welding Machines and Equipment, E. I. Arc

Hobart Brothers, Troy, Ohio
 Pier Equipment Mfg. Co., Benton Harbor, Mich.

Welding Machines, Resistance

Armco Co., Milwaukee, Wis.
 Eisler Engineering Co., Inc., Newark, N. J.
 Pier Equipment Mfg. Co., Benton Harbor, Mich.

Wire Working Equipment

Sleeper & Hartley, Inc., Worcester, Mass.

Wire Working Machinery

Sleeper & Hartley, Inc., Worcester, Mass.

Woodworking Machinery

Tannewitz Works, Grand Rapids, Mich.

Worm Drives

Michigan Tool Co., Detroit, Mich.

pinion. The illustration shows the line of Beverly shears Model No. 1 weighs 16½ lbs. and cuts stock up to 14 gauge. No. 2 weighs 32 lbs., and handles stock up to 10 gauge

Neu-T-Rol Issues Bulletin

A new 12-page booklet, describing the Neu-T-Rol products of the Electro-Matic Products Co., 4820 Deming Place, Chicago, has recently been issued. Neu-T-Rol switches facilitate the removal and demagnetizing of work from electric chucks. The various models are illustrated and described. The booklet, which is pleasingly printed and made up with a modern plastic binder, is available to BLUE BOOK readers.

Plating Die Castings

A reprint of an article by E. A. Anderson of the New Jersey Zinc Co., Palmerton, Pa., discussing the commercial plating of zinc alloy die castings, is available to BLUE BOOK readers who write to the company for it.

GORTON MAKES NEWS

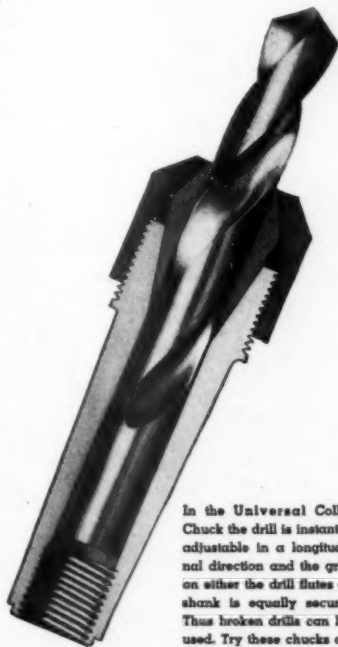
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For Single-Purpose Drilling



In the Universal Collet Chuck the drill is instantly adjustable in a longitudinal direction and the grip on either the drill flutes or shank is equally secure. Thus broken drills can be used. Try these chucks on your drill press or screw machine.

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Lists of Used and Rebuilt Machinery, either For Sale, Wanted, or For Exchange, set in uniform style, will be published in the Classified Section at the rate of \$5.00 for your name and address and a five line advertisement. For additional lines, 40c per line.

Write directly to those offering the machine for sale, for prices and full descriptions. If what you seek is not advertised, write Hitchcock Publishing Company, Chicago, making known your wants on either new or used machinery and the publisher will gladly pass them along to the advertisers.

FOR SALE BY

Aaron Machinery Co.,

176 Lafayette St., New York, N. Y.

Bolt threaders, Acme 2" and 3".....	\$295
Drills, Allen, Leland Gifford, 4-spindle, b. b.	395
Engraving machines, Gortou-Decker; all sizes.	
Grinder, surface, abrasive No. 3.....	695
Grinder, vertical, 14" Pratt & Whitney.....	375
Millers, vertical, 2 and 2A Becker.....	
Milling machine, universal, No. 2 Kempsmith.....	475
Pipe machines, Williams 6", motor drive.....	350

FOR SALE BY

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B. & S. GRINDERS & SCREW MACHINES
Grinders, Nos. 10 & 11 B. & S. Plain reconditioned at sacrifice prices.
Screw machines, (2) No. 00 Brown & Sharpe.

FOR SALE BY

Wm. C. Johnson & Sons Machy. Co.

1211 Hadley St., St. Louis, Mo.

Air compressors, 15 in stock.
Bender, No. 2, Williams White.
Boring machine, 30" Landis.
Boring machine, 44" Betts.
Boring mills, 6"-8" & 8"-12" Betts.
Boring mills, 44" & 10" Niles.
Boring mills, 60" Colburn; 36" King.
Brake, 10" chl. No. 10 p. plate.
Brake, 10" Robinson, 3/16" plate.
Die slotter, Garvin, 3/4" stroke.
Drill, radial, 4" Dresses.
Drills, 15" to 42" Barnes.
Gear hobber, No. 3 Adams.
Hammer, steam, 2500 to 250 lbs.
Lathe, 18" x 8" Boye & Emmes, q. c.
Lathe, turret, 14" Steine.
Lathes, turret, No. 3 B. & O.; No. 6 Wood.
Miller, No. 24 Rockford universal, s. p.
Millers, Nos. 3 & 4 B. & S. plain.
Pipe machines, 3"-4"-6"-8"-12".
Presses, Nos. 2, 3 & 4 Marshalltown.
Seamer, double, No. 5 Bliss.
Shapers, 12"-16"-20"-24".
Punches, shears, bulldozers.

FOR SALE BY

J. Bleser Mfg. & Machinery Co.

209 N. 16th; P.O. Box 793 Springfield, Ill.

Grinder, Landis universal, 10" x 30".....	\$150
Lathe, 36" x 18" L & S., q. c., arr. m. d.	1500
Milling machine, No. 6 Transit, d. b. g.	300
Shaper, 32" American, with vise.....	295
Welder a. c., like new, 350 amp.....	225

FOR SALE BY

Standard Machinery Co.,

347 Indiana Ave. Grand Rapids, Mich.

Automatic, 14" Gridley, model F.
Boring mill, 42" Bullard vertical.
Boring mill, 34" Lucas horizontal.
Cold saw, 6" Higley.
Drill, Baker 3" heavy duty.
Drill grinder, Sellers 3" capacity.
Grinders, No. 60 Heald Cylinder (2).
Grinders, No. 2 LaSalle (2).
Lathes, 8" Porter-Cable manufacturing (14).
Miller, model C-1 Becker heavy vertical.
Shaper, 15" Hendey, F. G.

FOR SALE BY

Russell Machine Co.

438 Oliver Bldg. Pittsburgh, Pa.

Boring mill, 84" Sellers, vertical.
Boring mill, 14/20" Niles ext. type vertical.
Boring mill, hor. N. B. P. 48" bar floor type.
Crane, 10 ton hand power traveling, 46' 9" span.
Drill, radial, 6" Niles universal, m. d.
Generating set, 400 k. w., a. c. steam.
Hammer, 5000 lb. double frame NBP steam.
Lathe, 36" x 11" Wickes heavy duty, double back gear.
Lathe, turret No. 2-A W & S ser. above 125,000.
Lathe, 32" x 23" Pond triple geared.
Milling machine, plain, No. 3 Cincinnati.
Pipe cutting and threading machine 6" Merrill.
Planer, Cincinnati 36" x 36" x 10' table.
Press, wheel, 200 ton hydraulic, 48 x 100", motor drive.
Press, No. 20 Bliss o. b. i., m. d. with motor.
Shaper, 24" Gould & Eberhardt.
Shear, alligator, United, cap. 5" square.
Shear, plate, L & A cap. 52" x 8".
Straightener, No. 1 Kane & Roach, cap. 3" rd m. d.
Upsetting machines, 25, 31, 4 and 5" Ajax iron bed.

USED AND REBUILT MACHINERY

FOR SALE BY

Marr-Galbreath Machinery Company

Blowers, pressure, Am. 11-PB. 14,000 CFM.
 Boring mill, 30" Bullard or V T L, threading attach.
 Drill, No. 11-15, Natco, 16 spindle, motor drive.
 Drill, radial, 30" Casady-Otto.
 Fan, ventilating, No. 4 American, 1/60/110.
 Forging machine, 14" Acme motor drive.
 Furnace, gas, Tate-Jones, 25"x23"x12".
 Grinder, No. 210 Heald rotary surface.
 Grinder, 4 HP. Mall, 1/60/110 flexible shaft.
 Grinder, No. 31 Landis 10"x30".
 Grinder, disc, No. 2 Gardner, 20" wheels, m. d. 3/60/220.
 Hammer, power, 90 lb. Boss, belt drive.
 Hammer, 200 lb. Beaudry, power.
 Hammer, 400 lb. Bliss board drive, belt drive.
 Keyseater, No. 60 Baker, capacity 7"x4", belt or m. d.
 Keyseaters, 3 M. & M., belt.
 Lathe, 9"x5" Monarch, c. g., pan bed, t. a. (3)
 Lathe, 16"x16" G-K., gear head, tap, att, for motor drive.
 Lathe, 18"x8" Superior, quick change gear, d. b. g.
 Lathe, 22"x12" Rahn-Larmon, quick change gear.
 Lathe, 26"x10" Wolcott, d. b. g., c. g.
 Nailing machine, No. 6 Morgan 8-track, m. d.
 Pipe machines, 3" Jarecki, b. d. 4" Williams, m. d.
 Polishing stand, 3 h. p., U. S., 3/60/220.
 Press, arbor 30 ton Lourie, Hydraulic.

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United Machinery & Supply Co.

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Brake, leaf, D. & K., 16"x16 ga. No. 304, a. c., m. d.
 Compressor, 5x5 Cub. in. loader.
 Grinder, univ. No. 13 Brown & S., many attach., b. d.
 Miller, Ingersoll slab, m. d., 4 heads, 24" wide.
 Nibblers, Campbell, 10" and 6" throat, motor drive.
 Press, No. 4 P Ferracut, 5500 lbs., 14" stroke.
 Presses, 37 Swaine No. 4 L. & J.
 Seamer, Niagara double, 40" cans, belt drive.
 Shear, 6"x4" capacity Bertsch 16" gap, b. g., b. d.
 Shear, 4"x4 ga. power.

FOR SALE BY

Rosenkranz, Weisbecker & Company, Inc.
2308 Singer Building, New York, N. Y.

Boring mills, 5" & 6" bar Detrick & Harvey, m. d.
 Boring mill, 60" Gisholt, rapid traverse, motor drive.
 Boring mill, 42" Niles-Bement-Pond vertical, m. d.
 Drill, multiple spdl., No. 30 Natco, m. d., 20" round hd.
 Grinder, 26"x120" Landis, plain, cylindrical, m. d.
 Grinder, Cincinnati 24", face mill, motor drive.
 Keyseater, No. 34 Baker and No. 20 Catlin, m. d.
 Lathe, 72"x46" Putnam, geared head, motor drive.
 Lathe, 64"x25" Gleason, motor drive.
 Lathe, 42"x18" Pittsburgh, quick change gear.
 Planer, 72" Morton draw-cut traveling head, arranged
 for boring, milling and drilling, motor drive.
 Plate planer, 30" Southwark, 16 pneu. clamps, m. d.
 Saw, No. 300 Espen-Lucas, hydraulic feed, motor dr.

FOR SALE BY

General Blower Company

401 N. Peoria St., - Chicago, Ill.

BLOWERS—FANS—EXHAUSTERS.

For Dust Collecting—Ventilating.

Oil and gas burners, capolas, furnaces, etc.

Roots—Connersville and centrifugal blowers.

What are your blower requirements?

57 Water St.,**Pittsburgh, Pa.**

Presses, o. b. l., No. 21 Bliss, 1" stroke (2).
 Presses, o. b. l., No. 3 Thomas, 2600 lb., new.
 Press or shear, United 34" shaft, m. d.
 Pump, centrifugal 700 GPM., 4" disc.
 Punch & shear, hand, No. 5 Buffalo, combined.
 Punch and shear, No. 3 L. & A., 3"x8", 14" throat.
 Riveter, No. 3A, Grant, cap. 6/16", for motor drive.
 Riveter, Shuster, 3/16", belted.
 Riveter, No. 120 Grant, capacity 8", motor drive.
 Roll, bending, No. 10 K. & K., 2"x3" cap., b. d.
 Saw, cold, No. 7 Espen-L., 18" belt.
 Saw, cold, No. 1 Newton, 48" belt.
 Saws, universal shaping, 6x6", motor drive.
 Shaper, 16" and 20" Smith & Mills.
 Shaper, 7" Rhodes vertical and horiz. gear box, m. d.
 Shaper, 24" Barker back gear V-ram, belt drive.
 Shear, rotary 232 Bliss 14 gauge.
 Shear, throatless 18-M Marshalltown, motor drive.
 Slotters, 6" & 30" Newton, m. d.
 Steam turbines, 100 horsepower 900 reversible (2).
 Tearing machines 600 & 1600 lb. hand.
 Valve refacer, Kwik-Way, cabinet base, motor drive.
 Welder, Arc 300 amp, 3/60/220.
 Wheel press, 60 ton 34"x84", belt drive.

FOR SALE BY

Reliance Machinery Sales Company

1405 Brighton Place, N. S. Pittsburgh, Pa.

Air compressor, 1190 cu. ft. Ingersoll-Rand.
 Drill, 3 spindle Foots-Burly adj. head, No. 5 MT.
 Boring mill, 42" Bullard, New Era type.
 Drills, radial, 3", 3 1/2", 4" and 5", tapping attachment.
 Grinder, No. 2 Greenfield universal tool and cutter.
 Grinder, No. 2 Brown & Sharpe surface, motor drive.
 Lathe, 38"x18" New Haven, cone head, cheap.
 Miller, No. 4 Cincinnati, plain, cone.
 Miller, No. 5 B. & S., plain, table 16"x54", cone.
 Planer, 36"x36"x12" Cincinnati, 3 heads.
 Press, No. 6 Toledo, o. b. l., 64" stroke.
 Press, No. 58 Toledo geared, 7" shaft 8" stroke, high
 die space (26"); about 38,000 lbs.
 Press, No. 97C Toledo, dbl. crank, 9" shaft, 72" wide,
 2" stroke.
 Press, Waterbury, open back, geared, 3" shaft, 5" stroke,
 weight about 4000 lbs.
 Shapers, 16", 20" and 24", various makes.
 Wire straightener & cut-off, 4"x5" Shuster.
 What do you need? What have you for sale?

FOR SALE BY

Joseph Hyman & Sons,

Tioga and Almond Sts., Philadelphia, Pa.

**WORLD'S LARGEST STOCK
POWER PRESSES**

No. 10 Bliss, double crank, tie rod, 62", shaft 10".
 No. 64 Bliss, double crank, tie rod, 48" shaft 64".
 No. 1655 Consolidated, double crank, 41", shaft 44".
 No. 754B Bliss, No. 768 Consolidated, gap types.
 No. 18 1/2" B. & No. 4 Bliss toggle presses.
 No. 25A Niagara, toggle press, tie rod, 6" shaft.
 No. 594 Toledo, tie rod, No. 201 Ferracut, 200 ton.
 6 & 8 plunger Waterbury Farrell presses.
 500 ton American Can Coining, 250 ton EG 53 Ferracut.
 150 ton No. E 52 Ferracut; 75 ton No. E51 Ferracut.
 150 ton No. 661 Toledo, 250 ton Waterbury F. coining.
 100 ton No. 21 Bliss, 50 ton No. 3 Bliss coining.
 Squaring shears, various sizes.
 These and hundreds of others of popular makes and
 sizes, are in stock at our warehouse here.
 Rebuilt and Guaranteed.

USED AND REBUILT MACHINERY

FOR SALE BY

E. L. Klauber Machinery Co.
320-322 South Third St. St. Louis, Mo.

Band saw, Klemm metal, 30" wheels, 12" vise, mtr. dr. Lathes, 10", 12", 13", 14", 15", 16" cone drive. Presses, No. 33 Swaine; 20 Bliss o. b. i. No. 71W Blissas. Riveters, No. 3-A high speed, No. 2 Grant; hamm. type. Screw machines, No. 0 H & S hand; 1, 2, 3 and 4 Foster. Shapers, 16", 20", and 24" Cincinnati, cone drive. Threading machines, Landis, 1" and 2" single head.

FOR SALE BY

Wigglesworth Machinery Co.
199 Bent Street Cambridge, Mass.

Boring mill, No. 21 Lucas horizontal. Boring mill, 24" bar Cleveland. Grinder, No. 3V Gallmeyer Livingston, hyd. surface. Grinder, No. 16" Blanchard, 30" chuck. Lathe, 18" x 10" Monarch, timken bearing. Lathe, 20" x 12" Monarch, geared head. Lathes, turret, No. 4 W. & S., timken bearings, (6). Miller, No. 3 Cincinnati universal, hi power, rect. arm. Shaper, 32" Hendey, vee ram, Timken bearing. Send for Complete Stock List.

FOR SALE BY

Surplus Stock & Machinery Co.,
620 W. Lake St., Chicago, Ill.

Drill presses, 1, 2, 3 and 4 spindle, h. s., b. o., all makes, Nos. 1 and 2 Morse taper, hand or power id. Lathe, 16" x 10" Monarch, grd. head, motor in base. Mill, No. 219 Brown & Sharpe plain, s. p. d. Nibbling machine, No. 1 Campbell, 3/16" capacity. Punch press, No. 54 Walsh o. b. i., back geared. Shapers, 16", 20", 24" Gould & Eberhardt. Complete stock of metal working machinery. Send us your inquiries.

FOR SALE BY

Belyea Company, Inc.
Main Office and Plant
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GUARANTEED electric motors, generators, m. g. sets, transformers, frequency changers, gas eng. sets, rotary converters, centrifugal pumps, condensers, starting equipment. All sizes. Largest stock in the East. Prompt delivery. We also buy and exchange.

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Lang Machinery Company

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Air compressors, (2) Sullivan, 40 c. f. 100 lb. b. m. d. Automatic, No. 0 Brown & Sharpe belt drive. Automatic, No. 52 National Acme 4-spindle, cap. 8" b. d. Automatic, model M Cleveland, 4 spindle, 8" motor drive. Bender, No. S19 Kane & Roach, 4" rd. motor drive. Bolt cutter, 1" Landis, 18"-3" Acme, sgl. hd., b. d. Boring mill, 30" Bullard, threading attach., s. p. d. Boring mill, 72" Betts, 2 hds., thd. att., b. d. Boring mill, vertical 84" Sellers, 2 heads, belt drive. Boring mill, hor. 24" bar Lucas, tbl. type., b. d. Boring mill, hor. 44" N. B. P. high column, m. d. Boring mill, hor. 6" Bement-Miles, floor type, m. d. Borer, port., N. H. P. Duplex, 44" bars, m. d. Brakes, leaf, Chicago, 7' x 10 ga., 8' x 12 ga., 10' x 10 ga., 10' x 16", 10' x 18 ga. hand. Brake, press type, 8' x 20 ga. Vulcan, b. d. Buffer and polisher, 74 h. p. Marchke, 230/3/60. Drill, heavy duty No. 1 Baker, 24" capacity 24", s. p. d. Drills, radial, 24" Cincinnati-Bickford, t. a., m. d. Drills, upright, 14" to 32", belt drive. Drill, 4 spindle No. 2 Foote-Burt, cap. 18", m. d. Gear hobber, No. 18H Gould & Eberhardt, m. d. Gear millers, No. 1 Bilton, capacity 4" belt drive. Grinder, surface, No. 2 Reid, 18" x 36", belt drive. Grinder, surface, 12" Pratt & Whitney vertical, m. d. Hammer, 100 lb. Bradley cushion helve belt drive. Hammer, No. 4-F Nasel, a. c. motor drive. Hammer, steam forging 5000-lb. Niles-Bement-Pond. Keyseaters, No. 2 Baker, 2", belt drive, (2). Keyseater, No. 4 Mitts & Merrill capacity 28" b. d. Lathe, 14" x 8" Hendey, tie bar, q. c. g. t. a., b. d. Lathe, 16" x 8" American high duty, q. c. g. t. a., b. d. Lathe, 20" x 9" Lehmann, geared head, s. p. d. Lathe, 20" x 24" Lodge & Shipley, q. c. g., b. d. Lathe, 24" x 14" Lodge & Shipley, q. c. g. t. a., b. d. Lathe, 25" x 10" LeBlond, q. c. g., d. b. g., chk. t. a., b. d. Lathe, 26" x 12" Bridgeford, hvy. duty, q. c. g. d. b. g., b. d. Lathe, 30" x 18" Schumacher Boye, q. c. g. t. a., b. d. Lathe, 36" x 16" N. B. P. q. c. g. t. e., b. d. Lathe, 40" x 10" H. S. & G. geared head, m. d. Lathe, 51" x 22" New Haven, triple geared, motor drive. Lathe, roll, 54" x 24" Standard, motor drive. Lathe, turret, 34" x 36" Cincinnati-Acme, s. p. d. Lathe, turret, No. 2-A Warner & Swasey, s. p. d.

Lathe, turret, 24" Steinel, 64" hollow spindle, m. d. Miller, plain, No. 1 Kemp Smith, 42" x 10", belt drive. Miller, plain, No. 2 Cincinnati, tbl. 46" x 10", b. d. Miller, plain, No. 24 LeBlond, tbl. 52" x 11-3/4", b. d. Miller, plain, No. 28 Ohio, table 52" x 11-3/4", belt drive. Miller, plain, No. 4 LeBlond, table 72" x 16", belt drive. Miller, plain, No. 24 Brown & S. tbl. 60" x 17-1/2", b. d. Miller, production No. 23 Kemp Smith belt drive. Miller, universal No. 2B Hendey tbl. 48" x 10", b. d. Miller, vertical, model "B" Becker tbl. 57" x 12", s. p. d. Pipe machines, Landis 4" to 2", belt drive, (2). Pipe machine, No. 304-B Oster, 1" to 4", motor drive. Pipe machine, 8" Williams, 24" to 8" motor drive. Pipe machine, No. 114 Merrill, 24" to 12", motor drive. Planers, 36" x 36" x 10" Cincinnati, 2 heads, belt drive. Planer, open side, 60" x 60" x 14" Cleveland, motor drive. Press, double acting, No. 1 Bliss, belt drive. Presses, No. 5 Bliss styles type, bed 17" x 20", st. 2", b. d. Press, trimming, No. 12 Erie, bed 26", str. 54", side sh. Press, wheel, 200-ton Hydraulic, 48" x 100", m. d. Profilers, Nos. E3 and E4, Keller, motor drive. Punch & shear, "C" Cleveland 13/16" x 8" belt drive. Punch and shear, Cleveland "CO" 2-1/2" x 48" throat. Punch and coper, No. 60 Covington, 2-1/2" m. d. Riveting hammer, No. 54B high speed, m. d. Rolls, angle, Kane & Roach 2" x 2" x 3", motor drive. Saw, hack, No. 7 Atkins, 8" x 38", motor drive. Saws, hack, 12" x 12" Racine, single pulley drive. Saw, hack, 13" x 16" Peerless, motor drive. Shaper, 28" Queen City, cone or Lima gearshift, m. d. Shaper, 24" G. & E. cone or Lima gearshift, m. d. Shaper, 24" Smith & Mills, cone or gearshift, m. d. Shaper, 20" Cincinnati cone or Lima gearshift, m. d. Shaper, 16" American cone or Lima gearshift, m. d. Shear, rotary, No. 10 Quickwork, 14 ga. 60" throat. Shear, rotary, Lennox, 8" x 38" throat, b. d. Shear, square 36" x 16" Niagara motor drive. Shear, squaring No. 242 Niagara, 42" x 14 ga. m. d. Shear, squaring, 10" x 22 ga. Peerless, foot. Shear, squaring, No. 4 Bertsch, 16" x 16 ga. m. d. Straightener, No. 24 Sutton-Abramson, m. d. Straightener, No. 1 Kane & Roach cap. 3" rd. m. d. Straightener, pipe, 8" Woodward, vertical, m. d. Straightener, 14" x 4" F. B. Schuster, belt drive.

USED AND REBUILT MACHINERY

FOR SALE BY

C. C. Howarth Machinery Co.
1440 Franklin St., Detroit, Michigan

Bending roll, Bertsch 8'; capacity.
 Boring mill, No. 31 Lucas, m. d., 3" bar.
 Grinders, Nos. 3 & 33 abrasive surface.
 Grinders, Capital int., m. d.; No. 106 Rivett int., m. d.
 Grinder, Heim centerless, m. d.
 Lathes, 16x8, 16x8 & 18x12 Hendey taper attachment.
 Pipe bender, 2" capacity.
 Shaper, 20" Ohio, m. d.
 Shear, alligator, No. 2 Badger, 12" blade, m. d.

FOR SALE BY

Segal Machinery Company
117 S. Clinton St., Chicago, Ill.

Air compressors, 10x10 Inger-Rand, Class E. R. 1.
 Boring mill, 42" Buliard, two heads on rail.
 Radial drills, 3" Bickford, s. p. d., motor drive.
 5' Niles-Bement-Pond, single pulley drive.
 Lathes, 15x8 Sebastian, motor in base, q. c. g.
 18x12 Milwaukee, semi-q. c. g. taper attachment.
 Millers, No. 48 Becker vertical, power feed.
 No. 3 Kempnath universal, dividing head.
 Screw machines, 14" Acme universal, geared head.
 Shaper, 20" G. & E., hi-duty, 23" American b. g.
 Partial list - Send us your inquiries.

FOR SALE BY

H. F. Wolnick Machinery Co.
9 S. Clinton St., Chicago, Ill.

Boring mills, vertical, 36", 48", 90", 120", (5).
 Keyseater, Mitts & Merrill, No. 3.
 Lathes, 15" swing to 36" bed, (10).
 Lathes, Hendey & P. & W., 15"x8" to 30"x8".
 Lathe, Hendey, 18x8, q. c. g., rebuilt, complete.
 Milling machines, (5).
 Planers, 24"x24"x8", (2); 48"x36"x8".
 Power sq. shear, 10 & 12 gauge 10 and 12", belt drive.
 Press, str. side 30x30 bolster, 6" stroke, geared, m. d.
 Burke, p. roll 8"x10".

FOR SALE BY

J. L. Lucas & Son, Inc.
3 Fox Street, Bridgeport, Conn.

Screw machines: No. 0 Brown & Sharpe high speed, serial No. 6157, rebuilt.
 No. 0G B. & S. high speed automatic, with a. c. motor, serial No. 5601.
 New Britains 8" and 1": and model C Acmes 1" and 1 1/2" several.
 Thruders, Brown & Sharpe high speed, No. 00G, serial Nos. 11637 and 11029, like new, (2).

FOR SALE BY

Scott-Bansbach Machinery Co.,

4607 West 20th St., Chicago, Ill.

Automatic screw mche., cone, 1", 4 spld., b. d., \$1000
 Auto. screw mche., B. & S., Nos. 00, 0, 2, \$800 to 1150
 Automatic screw machine, Brown & S. No. 00G with slotter, No. 5931 650
 Automatic screw mche., Brown & Sharpe No. 2 Turret Former, cap. 8" x3" belt drive 500
 Automatic screw machine, Brown & S. No. 19 high speed, capacity 8" x14" belt drive 400
 Automatic screw machine, Brown & Sharpe, No. 19 high speed, with motor 500
 Automatic screw machine, Davenport, 8" 5 spld., belt drive \$450 to 500
 Automatic screw machine, Cleveland, Model A & B 8" to 24" belt drive \$250 to 450
 Automatic screw mche., Cleveland 7 1/2" Model A belt drive, 13964 2500
 Auto. screw machine, Gridley, 9/16" 4" and 1 1/2" model F. & G. \$225 to 450
 Auto. screw machine, Gridley, 3 1/2" single spindle 200
 Miller, No. 9, Bristol, hand, 14"x44"x14" 135
 Miller, No. 1A Milwaukee, g. h., cap. 22"x8"x19" 600
 Miller, No. 1B Milw., g. h., cap. 28"x10"x19" 800
 Miller, No. 20 Ohio, plain, b. d., 28x18x15, vise 600
 Miller, No. 4 Cincinnati, plain, 42"x10"x21" 500
 Motor, 20 h. p. G. E., 220 volt, 60 cy., 3 ph., 1145 r. p. m., complete 175
 Pipe machine, No. 308 Oster, 24" to 8" belt dr. 400
 Planer, 24x24x6 Ohio heavy duty, 1 head 350
 Planer, 72x72x12 Gray, 4 heads 1,350
 Press, Stecher screw for dies, 1700 pounds 235
 Press, No. 15 Robinson, horn type with table and motor, a. c., 220 volt 250
 Press, No. 51 Toledo arch, 24" str., 56 t., 5300 lbs. 350
 Press, Waterbury Farrell, straight sided, geared, 8" stroke, 20 ton, 16" between 450
 Press, DG56, Ferracuta, tog., 8" & 10" str., 160 t. 1000
 Press, Hercules, 15 ton, power forging or broaching, motor drive 200
 Punch, shear & bender, No. 23 Armstrong-Blum 75
 Punch & shear, No. 82 Beloit comb. b. d., 1650 lbs. 175

Punch, Kneeland, 16" throat, shears 5"x1" flats, \$ 150
 Riveter, No. 14B, High Speed Hammer, capacity 1/2", motor shelf 100
 Riveter, No. 3A, High Speed Hammer, capacity 1/2", with 1 h. p. motor, 220-60-3 200
 Riveter, No. 4A, High Speed Hammer, 1/2" capacity, no countershaft 200
 Riveter, No. 5A, High Speed Hammer, cap. 1/2", motor shelf 275
 Riveter, Grant No. 82, 101A, 80 cap. 1/2" to 5/16", belt drive 50 to 125
 Roll feed, double, 54" stock, 2" str., from No. 21 Bliss press 75
 Saw, Cochran & Bly cold metal, 4" capacity 50
 Saw, No. 2 Klem, band, for metal cutting, b. d. 200
 Screw machine, Acme, plain head, 8"x4" b. d. 125
 Screw machine, B. & S., No. 1 plain head, 8"x3", belt drive 200
 Screw machine, Foster, No. 5 geared hd., 14"x8", power feed, s. p. d. 500
 Screw machine, S. & K., No. 4, friction hd., 14"x8" belt drive 250
 Screw machine, Garvin, No. 3, friction head, 14"x7", belt drive 150
 Separator, McKinnie, for chips, blower type, belt or motor 230
 Separator, No. 1 American, cap. 1/2 bushel, b. d. 75
 Separator, American, cap. 1/2 bushels, belt driven 250
 Shaper, 20" American, back geared, crank, vise and countershaft 450
 Shaper, 24" Queen City, back geared, single pulley drive or motor drive 750
 Tapper R. & S., 8" cap., horizontal, on pedestal 75
 Tapper, Garvin, No. 2 automatic, capacity 1/2" and 1" belt drive 150
 Tapper, Acme, 1" nut, 4 spindle, belt drive 100
 Turret lathe, 24"x24", J. & L., geared head, tools for bar work 150
 Turret lathe, 34"x36", J. & L., geared head, with chuck for chuck work 250

USED AND REBUILT MACHINERY

FOR SALE BY

The Rich Ladder & Manufacturing Co.
1000-1028 Depot St., Cincinnati, Ohio

GRANT SPINNING MACHINES
Several Grant spinning machines for 3/16 and 1/4 inch rivets, all in A-1 condition, fully guaranteed.

FOR SALE BY

The E. L. Essley Machinery Co.
831 W. Evergreen Ave., Chicago, Ill.

Automatics, Nos. 60, No. 6G, No. 6, B. & S.
Boring mill, 54" Colburn, vertical, m. d.
Grinder, No. 3 Diamond surface, motor drive.
Miller, No. 2 Kempsmith max., motor drive.
Press, No. A-3 1/2 Niagara, o. b. l., 55 ton.

FOR SALE BY

Industrial Machinery Company, Inc.
2200-2300 Fletcher Av. Indianapolis, Ind.
CINCINNATI PLANNER 42" between housings, 36" under the rail, table 8" between pockets; equipped with two heads on the cross rail.

FOR SALE BY

Nelson Machinery Co., Green Bay, Wis.

Boilers, used rebuilt, all sizes, power and heating.
Compressor, Ingersoll Rand 120 class ER-1, with Idler, unloader, and 50 HP SI. R. mtr. and control.
Drill, rad., 4" Bickford No. 1, s.p.d., No. 5 Morse tap.
Generators, 500 k. w. Westinghouse, 3-40-200-514 belted, bare, (2).
Planer, 30x30x5 Gray, belt drive, single head.

FOR SALE BY

West Penn Machinery Company

Air compressors, 30 to 2500 cubic feet.
Automatic National Acme "C" 9/16, m. d. 220/3/60.
Blower, No. 4 Roots, capacity 2110 c. f. m.
Bolt cutter, Acme 2", belt drive.
Boring mill, 42" King, belt drive.
Boring mill, 62" Bettis, 2 heads, belt drive.
Boring mill, hor. 24" Rockford m. d. 220/3/60.
Brake, 7 x 10 gauge Dreis & Krump motor dr. 220/3/60.
Buildozers, Nos. 2, 4, 6, 9, 28, & 30.
Crane, 5-ton Case, 65' span, 220-c.
Drill, radial, 5" Cincinnati-Bickford, motor drive 220 d.c.
Drill, radial, 5" Fostick m. d. 220/3/60.
Drill, radial 5" Keck-Prentice, single pulley drive.
Drill, multiple 25 spindle No. 30 Natco.
Drills, upright 10" to 36".
Engine, gas, 20 horse power Bessemer.
Flanger, McCabe, 4" capacity, dies.
Flanger, No. 208 Niagara, 10 Ga. b. d.
Gear cutter, No. 5 Brown & Sharpe, 60x11 motor drive.
Gear cutters, 11", 18" & 34" Gleason.
Gear tester, bevel 18" Gleason.
Grinder, centerless, No. 2 Cincinnati m. d. 220/3/60.
Grinder, roll, Farrel 28" x 76".
Grinder, double end 2 horse power 220/440/3/60.
Grinder, D.E., 3 horse power 220/3/60.
Grinder, disc, No. 8-20" Besly, belt drive.
Grinder, disc, No. 4 Gardner, motor drive, 220/3/60.
Grinder, Gisholt tool and cutter, motor drive, 220/3/60.
Grinder, surface 8" Head b. d.
Grinder, internal No. 60 Head, belt drive.
Groover, No. 275-A Niagara, 6, 16 ga. motor drive.
Hammer, power, 50-lb. Blacker.
Hammer, power, 90-lb. upright, belt drive.
Hammer, power, 100 lb. Bradley cushion helve.
Hammer, Bradley 500 lb. upright.
Hammers, No. 2-B, 3-B, 4-B, 6-B, Nazel.
Hammers, steam, forging & drop.
Hoist, 1 ton Shepard 220-V, direct current.
Keyseater, No. 2 & No. 0 Mitts & Merrill, belt drive.
Ladies, 20 ton Whiting, top pour.
Lathe, 11" x 5" Meyers, plain change gear, belt drive.
Lathe, 16" x 6" Fostick, double back gear, c. g.
Lathe, 18" x 8" Springfield, geared head t. a.
Lathe, 20x10 geared head Schellenbach, s. p. d.
Lathe, 22" x 12" R-L quick change gear, d. b. g.
Lathe, 24x10 Lodge & Shipley, c. g., d. b. g., t. a.
Lathe, 24" x 15" Prentice, geared head s. p. d., t. a.
Lathe, 42" x 18" Schumacher Boye, c. g., belt drive.
Lathe, spinning 32" belt drive.
Lathes, turret, No. 4 Warner & Swasey, belt drive.
Lathe, turret, No. 2A, Warner & Swasey, 38" m. d.
Lathe, turret, 17x6 LeBlond double back gear 18".
Miller, vert. No. 1 Brown & Sharpe, belt drive.
Miller, vertical No. 2 Knight, b. d.
Miller, vertical No. 6 Becker, motor drive.

1210 House Building,

Pittsburg, Pa.

Mixers, Sprout-Waldron, batch & liquid.
Pipe machine, 2" Landis, belt drive.
Pipe machine, 4" Oster, 220-3-60 motor drive.
Pipe mach, 2", 6", 8", 12" Williams, motor drive.
Planer, 36x36x10" Cincinnati belt drive.
Planer, 42x42" x 12" Cincinnati, 3 heads, belt drive.
Planer, 60x60x20" Pond motor drive.
Press, wheel 150 ton Caldwell, 42", b. d.
Press, cam, No. 69N Bliss, double action inclinable.
Press, hydraulic 100-ton Southwark.
Press, horning 42-A Toledo belt drive.
Press, 19 Bliss open back inclinable 24" stroke.
Press, No. 4 Toledo o. b. l., 34" stroke.
Press, No. 6 Toledo, belt 30x19.
Press, No. 55 Toledo, 8" stroke.
Press, No. 774 Bliss, 8" stroke.
Press, 788 Bliss, 12" stroke T. R.
Press, double crank No. 5 Bliss, 2" stroke, b. d.
Press, gap, No. 74 Bliss consolidated 48" stroke.
Press, screw, No. 87 Niagara, hand power.
Press, 6 spindle, Waterbury-Farrell.
Punch, EF Cleveland, 36" throat, 18" thru 1".
Punch, No. 4-A Kent Owensuniv. comb. m. d., 220/3/60
Pumps, centrifugal 8", 4, 1", motor drive.
Riveters, air, hammer, spinning.
Rolls, angle, Niagara 18x18".
Rolling mill, cold 9" x 18" motor drive.
Saws, friction, Nos. 2, 3 & 4 Ryerson motor drive.
Saw, cold, 48" Newton motor drive.
Saw, hack, Peckers, 6x6, 220-3-60.
Shapers, 16", 20", 24" & 28" Gould & Eberhardt.
Shears, alligator, 18", 2", 3", 4" & 6".
Shear, Angle 6x6x18" Long & Allstatter, m. d.
Shear, circle, Niagara, 4" cutters, 16 ga.
Shear, circle No. 3 Bliss, 40" x 20 gauge.
Shear, bar 18", New Doty, b. d.
Shear, squaring No. 48 Excello 14ga. bis. 53".
Shear, plate, 30" x 24" Pele.
Shear, 24x36" Bliss, belt drive.
Shear, rotary 24" throat capacity 4", m. d. 220/3/60.
Slitter, gang, 36" Voder motor drive.
Slitter, gang, 36" Bradcock, belt drive.
Shear, paper 45" x 18" Kent, belt drive.
Slotter, 6" & 24" Newton.
Straightener, 9/16" x 20" Shuster V belt.
Straightener, AS & TP 17" x 18" belt drive.
Straightener, 45" Aetna std. 17 roll 24" m. d. 220/3/60.
Straightener, 45" Aetna-Standard, 17 roll 34" m. d.
Straightener, No. 5 K & R, 24" square belt drive.
Tumbling barrel, 34" x 45", belt drive.
Thread roller, No. 7 W.F. capacity 14".
Thread roller, No. 201 V. & O., 4", belt drive.
Upsetters, 1" to 6".
Welder, spot 13 k. v. a., Taylor.
Welder, butt 14" Winfield.

USED AND REBUILT MACHINERY

FOR SALE BY

E. W. Smith Machinery Co.
523 N. High St., - Columbus, Ohio

Lathe, 20x10 Porter, cone head.
 Lathe, No. 4 Warner & Swasey turret, p. f. c.
 Press, crank, 7 1/2" Bliss, s. s. s.
 Punch, 20" throat Reade, 8 through 8.
 Shaper, 20" Smith & Mills, c. d., b. g.

FOR SALE BY

Faylor-Strafer Machinery Co.
136 Liberty St., - New York, N. Y.

Bolt cutter, 2" Landis double head, motor drive.
 Brakes, Ohl Power Press, 10"x10 ga. and 3/16".
 Crane, 10 ton Niles, 37" span, a. c. motors.
 Grinder, No. 14 Pratt & Whitney b. b., vert. surface.
 Grinder, No. 16 Blanchard high power vert., sur., m. d.
 Lathe, 20"x14" Bridgeford, geared head, m. d., taper.
 Lathe, 40"x34" Bridgeford geared head, motor drive.
 Lathes, turret, (2) 24" Libby h. d. Model C, m. d.
 Miller, Becker, duplex Lincoln type.
 Miller, Brown & Sharpe No. 24 plain.
 Shear, squaring, 30" Bliss, capacity 5/16".
 Shear, squaring 10" Geo. Ohl, cap. 3/16", motor drive.
 Table, circular, 42" mounted on base with cross adjust.

FOR SALE BY

Surplus Material & Machinery Co.
8735 Kercheval Ave., - Detroit, Mich.

Boring mill, Colburn, 36" swing, cone drive.
 Boring mills, model C & model SD Becker, s. p. d.
 Butt welders, 75 kw Taylor-Winfield; 25 kw Thompson;
 and 35 kw Federal, all 220 volt.
 Folder, 42" Jarecki, power.
 Grinder, Walker rotary surface, 10 1/2" chuck.
 Hammers, 2000 lb., 1500 lb., & 1000 lb. Chambersburg,
 board drop, (10).
 Lathe, 14"x10" Hendey, geared head, motor drive.
 Lathe, 18"x8" Hendey, yoke head, arr. for m. d.
 Leveling roll, 11 roll Yoder, 4 1/16"x33" rolls.
 Moulder, American No. 36-10", all electric.
 Mills, No. 4 Cincinnati plain, (2).
 Projection welder, 100 kw Federal, 220 volt.
 Press, No. 23-J Bliss, double crank, arr. for m. d.
 Presses, No. 3-A Toledo, o. b. i., direct m. d., (4).
 Press, No. 4 Niagara, o. b. i., belt drive.
 Press, No. 4 Bliss-Consolidated, o. b. i., m. d.
 Presses, No. 20 Bliss, o. b. i., belt drive, (3).
 Presses, No. C-3 Ferracute, o. b. i., b. d., (3).
 Press, No. 78 Toledo, open back, straight side.
 Presses, No. PG4, P4, P3, and P2 Ferracute.
 Press, No. 43-P Toledo, horning, arr. for m. d.
 Presses, No. 18-S Bliss, straight side, (20).

FOR SALE BY

Alex Zeeve
2244 Woolworth Bldg., New York, N. Y.

Drill press, 26" Sibley.
 Drill, radial, 3 1/2" Morris, s. p. d., gear box.
 Hammer, No. 8N Nazel, arranged motor drive.
 Hammers, 30 lb. Bradley compact; 150 lb. Baudry pwr.
 Keyseater, No. 2 Mitts & Merrill.
 Lathe, 19"x12" Sidney, q. c. g.
 Lathe, 18"x8" Flather, q. c. g.
 Lathes, 2-16"x10" Monarch, q. c. g.
 Lathe, 14"x8" Filsmith, 12 speed, g. h., s. p. d.
 Shaper, 24" American, back geared.
 Shaper, 20" Stockbridge, s. p. d.
 Also many other tools.

FOR SALE BY

Turner Machinery Co.
1638 Central St., - Kansas City, Mo.

Lathe, 18"x8" American, geared head,..... \$ 850
 Lathe, 18"x14" Hamilton, geared head,..... 1475
 Milling machine, No. 2 Cinc., univ., vert. attach.,
 very good,..... 1150
 Planer, 42"x42"x14" Ohio, two heads,..... 1175
 Screw machine, No. 6 B. & S., wire feed,..... 750
 Shaper, 24" Cincinnati, motor driven,..... 950

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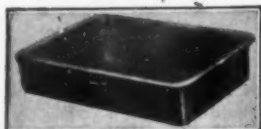
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J. D. Harris
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 Wanted one used Gorton Vertical Milling Machine
 with or without Pantograph attachment, 8-D size
 preferred. Must be in good condition.

UNIVERSAL TURRET LATHE

No. 4 Universal Warner & Swasey turret
 lathe, motor drive with motor in base, with
 complete electrical equipment and chucking
 equipment. GUARANTEED LIKE NEW.

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21x14x5 1/2—16 gauge

25,000

Used One Piece Steel Tapered

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50¢ each

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DESIRABLE MACHINES FOR IMMEDIATE DELIVERY

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Bolt Threader, Landis $\frac{3}{4}$ " cap. \$125
 Miller, No. 9 Kempsmith, 225

Pipe Thr., Bignall & K., 10" cap. \$450
 Planer, 30"x8", 250

Angle Iron Shears, Coving., 6x4x $\frac{3}{8}$ ", dbl. end.
 Automatics, Brown & Sharpe, late serial
 No. 00G—serial No. 9900; No. 00—serial
 No. 9800; No. 0G over 6700.

Bending Roll, 10' $\frac{3}{4}$ " H. & J.
 Bending Rolls 12' Niles, $\frac{3}{8}$ " cap., pwr. elev.
 5' $\frac{3}{16}$ "—4' 10 ga.

Boring mill, 36" Bullard New Era, side head.

Boring mill, 88" vertical,—42" N.B.P.

Brakes, box & pan, 6' 10 ga. Chicago Steel.

Brakes, hand, 10' 14—8' 16, 8' 12.

Brakes, power, Chgo. Steel; 10' 10 ga.; 8' $\frac{1}{4}$;

6' 12 ga. 12' 1/4", pwr. clamp.

Drill, No. 242 Barnes Camel Back.

Drill, 6 spindle Edlund, power feed.

Gang Slitter, 36" Yoder; 48" Bliss.

Grinder, No. 25 Heald Surf. 16" mag. chk.

No. 3 Abrasive Surf. 84" Diamond Face.

Grinder, Landis cyl., 22' avg. x 16' 6" bet.

centers, self-cont., extra wheels, fixtures.

Hammer, drop, 400 lb. Standard.

Hand millers, No. 2 Kent Owens (4).

Ironworker, Univ., Schatz, 6x6 ang., 3x3 Smith.

Lathes, South Bend, 9"x3 $\frac{1}{2}$ "; 16/24 gap.

Lathes, 30"x16" L&S., 48"x18 Schu. & Boye.

Lathes, 36"x30" L. & S., 24" centers, c.g.c.

Lathes, spin., Prybil 22", bb.; Tol. 30" bb.

Miller, No. 3 Kempsmith univ. m.d. with DH.

Millers, Pl. & Vert., No. 3 Inger. 14x48 tbl.

Millers, Pl., No. 3B, No. 1A K. & T., dbl. over.

Millers, Univ., No. 2A B. & S., div. hd., m. d.

Miller, Plain, No. 4-B B. & S., m. d.

Milling machine, Ingersoll planer type, with

40 h. p. motor, table 48"x22' 8", 2 hor. hds.

for roughing, 2 hor. hds. for finishing.

Nibblers, Campbell No. 1 & 1B, m. d.; No. 2.

Planer, 26"x8' Cleveland, openside.

Planer, 60x60x18 N. B. P., 4 hds., m. d.

Punch, sgl. end, No. 9 Beatty, cap. 2 $\frac{1}{4}$ "x1 $\frac{1}{8}$ ";

G15 Rock River, cap. $\frac{3}{4}$ "x $\frac{3}{8}$ ".

Saw, Friction, No. 1, No. 0 Ryerson & No. 2.

Radial Drills, 5' & 6' American; 5' Fosdick.

Rivet Spinners, Grant No. 80; No. 103; No. 107.

Roller Die Machine, 6 sp. Yoder, m. d.

Roller levellers, 48", 17" rolls, motor drive; 36"

H. & J., 18 rolls.

Screw Mch., auto., No. 506 New Brit. 6 sp.

Screw mach., auto., 4 spdl. Gridley, 14" cap.

Shapers, 16" Hendey gr. box; 16" & 24" G. & E.

Shaper, 24" Ohio Dreadnaught, tilt top tbl.

Shears, 16' 3/16", 10' $\frac{1}{2}$ ", 10' 3/16", 10' 10

ga., 10' 16 ga.

Shears, throatless, 10 ga. $\frac{1}{4}$ ", $\frac{1}{2}$ ".

Shears, power, 13', $\frac{3}{8}$ " 8' $\frac{1}{4}$ " Bertsch; 6' 10 ga.

Shears, rot. Quickwork, No. 10, 60" thr., 14 ga.

Turret lathe, No. 4A & 2A W. & S. univ.

Welders spot: 5, 7 $\frac{1}{2}$, 10, 25, 50 KW; press type;

100 KW Federal; 75 KVA National.

Welders, Butt, 10 KW Thompson; 5K V A Taylo

Wire Straightener, $\frac{3}{8}$ "x8"; No. 6 Wells, $\frac{3}{8}$ "x22".

A FEW PRESSES FROM OUR LARGE STOCK

PRESSES, straight side, tie-rod fr.

No. 59 $\frac{3}{4}$ Toledo, m. d., air cushion.

No. 58 Toledo; No. 205 Bliss, 8" str.

No. 57 cons. 6" st; No. 6 Am. can.

PRESSES, double crank

No. 615-F Nia. 50x84—bed 12" stroke

air cushions.

No. 8-F Bliss, 120" bet. hsgs., 20" str.

No. 7-F Bliss, 96" between uprights:

Niagara No. 615, 62" between upr.

No. 96-G Toledo, 149" bet. uprights,

24" str., tie-rod, wt. 162,000 lbs.

No. 17 Bliss, gap frame.

Hyd, Watson S., 200 ton, 2-10" rams.

PRESSES, toggle

No. 409 Bliss, 60x109, air cushion.

No. 408-B Bliss, 84" bet. upr., 58x84.

No. 3 $\frac{1}{2}$, No. 5S Bliss; No. 3 $\frac{1}{2}$ -B Bliss

PRESSES, OBI

No. 6A Bliss, 7" st., No. 7A m.d., b.g.

No. 5 Nia.; No. 4 Bliss; No. 5 Toledo;

No. 2 Am. Can.; No. 2 Rock.; No. 3 Nia.;

PRESSES, horn

No. 24 Bliss, No. 14 $\frac{1}{2}$ Toledo; No.

116-A Niagara; No. 41 Toledo.

PRESSES, Coining

No. 666 Toledo, 1000 ton.

No. 27K Bliss 1000 ton.

600 ton Waterbury-Farrel.

PRESS BRAKES,

New Vernon All Steel, gap frame, 96",

14 ga.; 78", 14 ga.; 52", 18 ga.

Chicago, 10' 3/16" cap., m. d.

PRESSES, Styles

Ferracute No. P2, P3, P4; No. 34

Toledo, b. g.; No. 3 & 4 Bliss.

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Machinery Co., Inc.



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BORING MILLS

- 24" and 42" Bullard New Era, m.d.
30", 36", 42" Bullard, 2 heads on rail.
37" Niles, m.d.
40", 42" King, m.d., p.r.t.
48" Niles-Bement-Pond Car Wheel Borer.
60" Gisholt, m.d. thru gear box, p.r.t.
60" Gisholt, m.d., D.C. motors, p.r.t.
72" Niles, cone.

12' Cincinnati Massive Pattern Vertical Boring Mill, motor drive, with D.C. motors, steel rams, power rapid traverse, 2 swivel heads, very late type.

- No. 1 Cleveland Horizontal, 2½" bar.
No. 4 Niles Horizontal, 5½" bar, m.d.

MILLING MACHINES

- No. 2B, 3B Milwaukee Plain, double overarm.
No. 2, 3, 4 Cincinnati Plain, s.p.d., round overarm.
No. 3 Cincinnati Plain, rect. overarm.
No. 1, 2 Cleveland Plain, s.p.d.
No. 1½, 2, 3, 4, 5 Cincinnati Plain, cone.
No. 3 Kempsmith Plain, cone.
No. 4 Kempsmith Plain Maxi-Miller, m.d. in base, National Standard Spindle, anti-friction bearings.
No. 13B Brown & Sharpe Plain, s.p.d., National Standard Spindle.
No. 2 Garvin Universal, cone.
No. 2 Rockford Universal, s.p.d.
No. 4 Cincinnati Vertical, s.p.d., p.r.t.
No. 4B, 5, 6 Becker Vertical, cone.
6x80" Pratt & Whitney Thread, belt.
24" Cincinnati Plain Auto., m.d., Natl. Std. Sp.
24" Cincinnati Duplex Automatic, belt.
24" Cincinnati Duplex Automatic, belt.
28" Cincinnati Semi-Automatic Duplex, belt.
48" Cincinnati Worm Driven Plain Auto., m.d.
48" Cincinnati Worm Driven Duplex Auto., m.d.
48" Oesterlein Tiled Offset, m.d., Timken Bearings, National Standard Spindle.
No. 30 Sundstrand Rigidmill, m.d.
No. 33 Kempsmith Mfg., s.p.d.
C60A Newton 3 spindle continuous, m.d.

PRESSES

- No. 1½ Bliss Cam, belt.
D2, DD2 Ferracute Drawing.
P2, P3, P4 Ferracute Stiles Type.
No. 5 Bliss Stiles Type.
No. 6 Waterbury-Farrel D.C.

- No. 33 Swaine O.B.I.
No. 35 Toledo Stiles Type.
No. 50-4-36 Minster S.S. D.C.
S51 Ferracute D.C.
DG53 Ferracute Redrawing.
No. 54A Toledo Special.
No. 92B Toledo D.C.
No. 94 Bliss Consolidated.
No. 168½ Toledo Toggle Draw., wt. 124,000 lbs.
No. 268½ Toledo Toggle Draw., wt. 175,000 lbs.

GEAR MACHINERY

- 11" Gleason Bevel Gear Generator.
No. 3, 12 Barber-Colman Gear Hobbers.
No. 12 Barber Colman Gear Hobbers, dbl. ovrm.
No. 3, 4, 5, 6 Brown & Sharpe Gear Cutters.
No. 34, 44 B&S Gear Hobbers, m.d.
No. 5A Lees-Bradner Gear Generator.
No. 6, 61, 615 Fellows Gear Shapers.
No. 7 Fellows H.S. Gear Shaper.
16" Cincinnati Gear Hobber, m.d.
No. 16HS Gould & Eberhardt Gear Hobber, m.d.
No. 18HM 2 sp. Gould & Eberhardt Gear Hob.
No. 60H Gould & Eberhardt Gear Hobber.
Schuchardt & Schutte Gear Tooth Rounder.

PUNCHES AND SHEARS

- No. 4CNC Ryerson, m.d.
No. 3 Hilles & Jones, cap. 1¼" thru 1", m.d.
No. 6 Long & Allstatter, ½" thru ½".
Cleveland EF, cap. 1¼" thru 1", double end.
Cleveland S.E., m.d., type C.

SLOTTERS

- 8" Betts, cone.
10" Betts, belt.
10" Niles, m.d., brand new.
15" Newton, belt.

PLANERS

- 24" Cincinnati Crank, m.d.
24"x24"x6' Gray, 1 head.
24"x24"x6' Ohio, 1 head.
28"x28"x10' Cincinnati, 1 head.
30"x30"x8' Pond, 1 head.
30"x30"x10' American, 1 head.
30"x30"x12' Gray, 2 heads, m.d.
30"x30"x12' Fitchburg, 3 heads, m.d.
30"x36"x12' Niles, 4 heads, m.d.
30"x42"x26' American, 4 heads.
30"x30"x10' Cincinnati Forge, 2 heads.
48"x48"x14' Niles, 3 heads, rev. m.d., box table.
48"x48"x15' Niles, 4 heads, rev. m.d., box table.
48"x48"x16' American, 2 heads, p.r.t., rev. m.d.
48"x48"x18' Putnam, 4 heads, belt.
60"x60"x16' Gray, 2 heads.
60"x60"x30' Liberty, 4 heads, new.
144"x78"x48' Liberty Openside.
Wm. Sellers & Co. Plate Planer, 16' cap.

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THE EASTERN MACHINERY CO.

1000 Tennessee Avenue

Cincinnati, Ohio

Good Used Machinery

ARC WELDER: Wilson 300 amp., 15 h.p. motor; portable.

BORING MILLS: Niles 36" c. d. Bausch 44" m. d. N-B-P 54" s. p. d. Vert. with 2 heads; Barrett 5" bar c. d. horizontal; Bullard 51" Vertical 2 heads; Colburn 60" vertical. 2 heads.

BRAKES: D & K 10' 10 GA. M. D. & D & K 10' 16 GA. Hand.

DRILLS (RADIAL): Mueller 2½', Fosdick 2½', Prent. 3'; Carlton 4' all gear box dr.; Hammond 4' sensitive; Amer. 2½" M. D. gear box.

DRILLS (H. S. B. B.): H & W 2, 4, 5-sp.; Allen 2 & 6-sp.; Avey, Demco, Lel-Giff. 1-sp.; Avey 2-sp.

DRILLS (MISC.): Baker No. 217 (2) & No. 314 Hvy. Duty; Hamilton 42" S.H.; Barnes 20" & 24" 1-sp. & 20" 4-sp. & 24" 3-sp. all grd. camel back; P & W No. 12 Multi-Sp.; Natco 20-sp.

GEAR CUTTERS: G & E 36", G & E 48", G & E 60" & B & S 26" s. p. d. automatic spur; Fellows 36" gear shaper. Cincinnati 36" gear cutter.

GRINDERS: P & W 12" vert. surf.; Cin. No. 1½' B & S No. 12 univ. tool, B & S Nos. 11 & 16 plain, Heald Nos. 60 & 65 Int.; B & S No. 13 Univ. & Tool; Landis 10x30" Plain; B & S 10x48"; 3—Norton 6x32" plain, Heald No. 20 Rotary Surface (3). B & S No. 2 Univ.; Diamond No. 2 surface; Badger No. 220, auto. d.e., opposed disc (4); Webster & Perks No. 2 Univ. Heald 16" Chuck Rot. Surf.

KEYSEATER: Mitts & Merrill No. 5 vert. & Davis No. 1 vert.

LATHES: Reed-Prent. 16"x8" grd. hd.; LeBlond 18x8"; Lehmann 18"x9"; Amer. 22x8"; Whit. Blais. 22"x8"; Davis 22"x10"; L & S 20"x10"; S-B & E 20"x10" q. c. g.; Flather 22"x10", Schumacher-Boye 24"x14"; P & W 17"x10".

MILLING MACHINES: Van Norman No. 2 duplex; Ohio No. 29 Univ.; Kemp No. 3; B & S No. 3; Cleve. No. 1 s. p. d. univ.; Amer. No. 1½; Cin. No. 3; B & S No. 3; Hendey No. 3; LeBlond No. 3; Mil. No. 3-B & Cinc. No. 3 s. p. d. pl.; Becker Model "B" & No. 6 vert.; Kemp. No. 33 s. p. d. Prod.; Ingersoll slab, m. d. 33", table 30½"x16"; LeBlond No. 4 m. d. pl.

PIPE MACHINES: Landis 12" A.C., m.d.; Landis 2" m.d.

PLANERS: Gray 30"x30"x10' 2 heads; Flather 24"x24"x6"; Gray 28"x28"x6' 1-hd.

PUNCH PRESSES: Bliss No. 19 o. b. i.; Toledo No. 3 o. b. i.; Federal Nos. 1, 2, 3 o. b. i.; R. & K. No. 3 o. b. i.; Bliss No. 62 geared; Ferracute No. P-4, Bliss No. 65-N, 68-N dble. action; Toledo No. 52 arch; Fer. No. EGF 52 Coining; Niagara No. 4½; Willard No. 4-A o. b. i.; Swaine No. 38 arch, geared; Emco, Swaine No. 27 bench presses; Cons. No. 3, L & J No. 3, Bliss No. 21, Swaine No. 37 o. b. i.

SAWS (HACK): Racine 6x6" H. S. (4); Peerless 6x6" M. D. Univ. Shaping (2). **SHAPERS:** S & M, G & E, Ohio, Mil., Q. City, Davis, Cin. 16"; Ohio & G & E 20"; S & M, Q. City, Rock, 24"; Ohio 26"; Cin. 24" s. p. gr. box; Rhodes 3½" Vertical; American 24" heavy, b.g. Amer. 15".

SCREW MACHINES: W & S No. 4 & No. 6 Hand; Nat. Acme. Nos. 515, 52, 55, & 56 4-sp.; Grid'ey 4-sp. 7/8"; Automatic, B & S No. 00 auto.

SLOTTER: Bement-Mills 10" vert.

SQUARE SHEARS: OHL 48", 14-Ga. Excel. 62" 12-Ga. Power.

TAPPING MACHINES: (2) Garvin No. 2 Vertical Automatic & Garvin No. 1.

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TURRET LATHE: Bullard 36" vertical, rapid production. Bausch 24" M.D.

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PARTIAL LIST—LOW PRICES

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No. 3B Hvy. B. & S. Plain M. D.
No. 2 B. & S. Universal.
No. 3 Kemp Smith Plain.
No. 2 Cincinnati Plain.
No. 1A—K. & T. Plain.
SHAPERS & PLANERS
24¹ Cincinnati.
24¹ Kelley.
20¹ Steptoe S. P. D.

16¹ Cincinnati S. P. D.
36x36x10 Ohio Planer 2 Heads.

LATHES

36"x16" New Haven Q. C.
24"x8" Schumacher Boye Q. C.
16"x6" American Taper Attach.
16"x6" Prentice Geared Head.
16"x6" Monarch Grd. Hd. M. D.
14"x6" American Grd. Hd. M. D.
14"x6" American Cone.

GRINDERS

14x50 Norton Plain M. D.
6x30 B. & S. Plain.
No. 2 Bath Universal.
No. 3 Cincinnati Tool & Cutter.
MISCELLANEOUS
Nos. 12, 1, & 7 B. & S. Scr. Mchs.
4 1/2" Gridley Auto Sgle. Spdle.
6 Spindle Holmes Tapper.
No. 99 Stoll Toggle Press 5" Crk.

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PHILADELPHIA'S LARGEST DEALERS IN MACHINERY & EQUIPMENT

Bolt cutter, 38" Acme, belt drive.
Crane, 20 t. Marie Gantry, 36" span.
Drill, D2 Colburn, 3" cap.
Drill, 3 spdl. Allen b. b. sensitive.
Grinder, No. 33—Abrasive surface, cap. 22"x7"x9", motor in base.
Grinders, No. 3 Diamond, surface, cap. 13"x48", motor drive.
Grinder, No. 103 Rivett, int., belt.
Hammer, 100 lb. Bradley, Helve.
Hammer, 1100 lb. Niles-Bement-P. steam forging.
Lathes, 18"x10" L. & S., g. h., t. a.
Lathes, 25x14 Sidney, raised to 44".

Lathe, 50" New Haven, chkg., belt.
Lathe, 36"x26" Johnson, belt drive.
Lathe, 36"x16" Putnam, triple geared quick change.
Miller, "D" Becker vertical, m. d. throat 29", table 20"x36".
Miller, No. 3 Cincinnati plain, table 52"x12".
Miller, 18 Hendey, univ. reg. equip.
Nibbler, No. 2 Campbell, cap. 8" throat 12", motor drive.
Pipe machines, 3, 4, 6, 8 and 12" belt and motor drive.
Planer, 48"x48"x16" Poed, 4 heads.

Press, No. 2 1/2 V. & O., inc. roll fd.
Press, No. 41 Robinson geared, dbl crank bed 36"x24" stroke 2", wt 11,000 lbs.
Press, Waterbury, dbl. cr., flywheel bed 53"x23", str. 3", wt. 13000 lbs.
Punch, 24" Rock River, motor dr. 8"x1".
Punch, No. 2 H. & J. horiz., cap. 1"x1".
Saw, 18"x10" Napier, metal band.
Shear, L. & A., angle, 6"x6"x1".
Turret, 3A W & S chucking equip., motor drive.

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NEW 3 Phase Motors 1 to 20 H. P., 5 H. P. \$55.75

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11"x 4" Schafner Bench Lathes, motor drive, (new).
11"x 5" Summit floor type, c./s. drive, (new).
10"x 6" Sidney floor type q. c. 3 step cone, d. b. g.
10"x 5" Monarch floor type, compound rest.
12"x 6" Monarch quick change gear.
14"x 6" LeBlond loose change gear.
16"x 8" Hamilton quick change gear.
16"x 8" South Bend loose change gear.
16"x 8" Monarch 3 step with taper attachment.
16"x 5" Monarch geared head motor drive.
14"x 8" Young loose change gear.
14"x 8" Monarch 3 step double back gear.

20"x10" Bradford heavy duty.
24"x24" Prentice, l. c. g. with raising block.
21"x10" LeBlond extra heavy duty.
21" and 24" Gisholt motor drive.

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No. 1 Kemp Smith universal milling machine.
No. 4 LeBlond plain milling machine.
24"x20"x8" Ingersoll Miller, motor drive.
16" Ohio back geared Crank Shaper.
36"x36"x14" Gray Planer, 2 heads.
36"x36"x12" Gray, extra hvy. pattern Planer, 4 hds.
Brand new Marquette No. 300 welder, regular equipment greatly reduced price.

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America's Leading Machinery Rebuilders

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Bullard, 30" New Era.
B., 30", 42", 2 hds. on rail.
Colburn 60", 2 hds.: Bullard
76" vert.
Universal, No. 3A Horl.
Rockford, No. 2, 2" bar.

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P. & W. No. 1 Gun Barrel.
P. & W. Nos. 11, 12, 13 Mult.
Nasco Nos. 35 & 37 Mult. Sp.
American 2" Radial.
N-B-P 6' Radial. Univ.
Colb. No. 20 Mfg. H.D. S. P.
Upr. Drills—All makes & siz.
Henry & Wright, C. L., 3 Sp.
Allen 3 Spdls. & 4 Sp. B.B.
Leland Gifford 3 sp.: All p.f.
Sipp 4 S., ty. BW-4, 8" ovhg.
Detroit No. 2, 5-Spd. Hor.

GRINDERS

B.&S. No. 1, 2, 3 Univ.
Heald No. 72 Sitematic Internal Hyd. M.D.
Bryant Nos. 6, 10A, 18A S-A.
2 Sp. Hole, No. 40 Chuck.
Disc Grind.—All makes & siz.
Gardner No. 77 Disc, M.D.
Heald No. 70, 85 Internal.
Rivett No. 6, 103 Internal.
Nort., 6x32", 10x36", 10x50",
10x72", 14x36" Pl. Cyl.
Brown & Sharpe No. 10, 11,
12, 14, 16 Plain.
Landis 6"x30" Hy. 8-C. Pl.
P.&W. 8"x36" Barrel Spot.
Blanchard No. 16 Rotary Surf.
Wilm. & Momm. No. 3 Surf.
Cinc. No. 1, 1½ Tool & Cut.
Norton No. 1 Univ. Tool & C.
Oakley No. 2 Univ. Tool & C.
Cinc. 12x36" Univ. & Plain.
Cla. 12"x18", M.D. P. C. (2).

LATHES

Hendey 14"x6" with Tap. At.
LeBlond 9"x16" Multi-Cut.
Gisholt No. 16 Simplimatic.
Sundstrand 9" M.D. Mfg.
L.&S. 16"x6" Selec. Grd. Hd.
Hendey 16"x8", 18"x8"
LeBlond 17"x10", q.c.g.;
Whitcomb-Blaisdell 18"x8".
Blaisdell 19"x17" L.C.G.
Hend. 20"x14" G. Hd. M.D.
LeB. 21"x6" H.D., D.B.G.,
Q.C. Auto. Prod. Lathe.

New Haven 24"x10", 24"x12",
24"x20".

American 26"x14" g.h.
Gisholt Type "T"—24" T. T.
B. & O. No. 4, Turret.
P.&W. 1½"x18, 2x26, 3x36 T.
W.&S. Nos. 1A, 2A, 3A Tur.
Foster No. 2B Turret.
W-F No. 3 Chucking.

MILLERS

Brown & S. No. 1½, 2A Univ.
Cincinnati No. 1½ Univ.
Van Norman No. 1½ Duplex.
Kemp Smith No. 1 Plain.
Garvin No. 21 Plain.
Kemp. No. 33, SFD, P. (2).
LeBlond No. 3H Plain.
Milwaukee 1B, 2B, Doub. Ov.
Cinc. Nos. 1½, 2, 3, 4 Pl.
Becker No. 6 AB V.
Knight Nos. 1½ Vert.
Lincoln Millers of all kinds.
Hand Millers—All makes.
Gooley & E. Types A&B Brig.
Thurston Die Millers.
P.&W. 4½"x12", 6x14", 6x30",
12x48", 6x80" Thread Mill.
Lees-B. No. 8 Thread Miller.
Milwaukee & Cam Millers.

PRESSES

Fer. GD 54 S.S. Draw. DG 73.
Bliss No. 18 & 20 O.B.I.
V.&O. No. 12, 14 D.A. C. In.
Far. Fdy. 4½" S. D. Pwr.
Waterbury-F. No. 4 Stat. Cut
Back Frame Power
Manv. No. 4 D.A. Pillar Crk.
Waterbury-F. 20 ton H. Sp.
Grd. Rack & Pinion Draw.
Bliss No. 61—O.B. Reducing.
C. No. 72, O.B., 74, 074 & 04.
Zeh & Hah. 8½"C Percus.
Bliss No. 21, 100 ton K. J.
W-F 200 ton knuckle joint.
Bliss 7 D.B.G., S.S. Draw.
Wat.-F. No. 6 D.A. P. Cam.
Bliss No. 41 Inc. D.A. Crk.
Ferracute No. 105 D.A.
Ferr. D.G. 53 S.S. Draw.
Terkelsen D-1 150T. M. Spg.
Wat-Still. 60 ton H. Broch.
Bliss No. 73½ & 74½ S.S.
Stand. No. 4-R-S.S. Reduc.
Ferracute No. P3-P4.
Ferracute No. D-57, S.S.
Bliss No. 4—Stiles—Punch.
Ferr. No. 53 Stiles Press.
W-F 6" stk. O.B. g. u. m.,

toggle act. swag. alide.
Bliss No. 3¼A & 3¼B Tog.
Bliss No. 16, 4" str., Overh.
O.B.I. Trim.
Wat.-F. No. 2 Sub. Pillar.

SCREW MACHINES

Grid. 1½" Mod. G.
N. Brit. No. 632 M.D. Ch.
Clev. ¾", 1½", ¾", ¾", 2",
2¼", 2½", 4¼" Auto.
B.&S. Auto.—most sizes (we
are specialists)
Nat-A. 55, 55, 56, 515 Auto.
New Brit. 1x5", 1½"x7" A.
Davenport No. 2—M.D. Auto.
Cone, 1¼" & ¾" Auto.
N. Brit. Nos. 23, 33 A. Ch.
Potter & J. No. 5A, 6A Ch.
Hand Screw M. of all makes
& sizes; W.&S., Foster,
Brown & S., B.&O. Garv.
Jones & L. St. Hd. T. L.,
2½"x24", 3"x36".

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Band S., H.&R. 6" M. Cut.
Blowers, 100 Bl. in stock.
Broaches, LaPointe 1-2-3-4.
Broach, Foot Burt, No. 1
M.D. Hyd. Vert.
Burnishing Barrels, Abbott.
Cent. Mach. Whit. & P&W.
Die Sinker, P.&W. No. 2.
Drillers—Enterprise Type A,
No. 1, 8 Sp. Vert. Arr.
for M.D.—A bargain.
Drills, Upright, Multi. Sp.
Radial and Gun B. Drills
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Engraver, Keller No. 2 Pro-
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sizes.
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Punch & Shear, New Doty
No. 17.
Punch & Shear, Hillis &
Jones No. 4.
Saw—Peerless 9"x9" Univ.
Shaping, M.D.
Slitter—Braddock 36" M.D.
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ter.
Tapper—Anderson No. 40
M.D.
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Barnes 14", 22", 26", 36".
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Avey 1, 2, 3, 4-spindle, ball bearing.

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LATHES

Monarch 16"x8", geared head, m. d.
Rockford 20"x10" d. b. g., q. c. g.

Pratt & Whitney 16"x7", q. c. g.
Sidney 15"x8" d. b. g., q. c. g.
Seneca Falls 9, 10"x4".
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Milwaukee 1½-B, 1-B, 2-A, s. p. d.
Milwaukee, vertical, No. 1½-B, s. p. d.
Brown & Sharpe, No. 3-B, s. p. d.
Hendey Norton No. 1½ Univ., c. dr.
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SHAPERS

Rockford 20 and 24", vee ways, m. d.

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24" Gould & Eberhardt Shaper, cone.
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24"x10" swings 27½" Greaves-Klusman heavy duty
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14"x6" Hendey Lathe, cone.
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No. 11 B. & S. plain grinder.
14" Pratt & Whitney surface grinder.
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General Electric 200-ampere, A. C. (10).
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Hanson Whitney Thread Mill, S. P. D.,
fine condition.

4" Lo-Swing Production Lathes, Hard-
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Practically new 6" Cap. Espen-Lucas Cold
Saw, Hydr. feed and clamping, m. d.
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Drills, 16x30", 20x40", 22x52" Heads,
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No. 21 Lucas Horizontal Boring Mill,
Rebuilt with 4 speed Geared M. D.

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Lathes

- 14"x8" Lodge & Shipley Grd. Hd. S.P.D. Taper.
- 17"x12" LeBlond, three step cone drive.
- 18"x14" Monarch Helical Grd. Hd. M.D.
- 20"x8" American Grd. Hd. S.P.D.
- 20"x10" American 3 S.C.D. D.B.G.
- 20"x14" Hendey Cone, Taper.
- 21"x8" LeBlond, three step cone drive.
- 22"x12" L & S Grd. Hd.
- 24"x12" American Cone H.D. Q.C.
- 24"x22" Bradford Cone, Taper.
- 25"x12" LeBlond, three step cone drive.
- 30"x10" American H.D. Grd. Hd. 12 speed.
- 30"x10" American, three step cone drive.
- 30"x20" American 12 speed Grd. Hd. S.P.D.
- 36"x12" L & Sel. Grd. Hd. Taper S.P.D.
- 36"x24" L & S Sel. Grd. Hd. Taper S.P.D.
- 42"x18" Bridgeford Grd. Hd. M.D.
- 42"x20" American Grd. Hd. M.D.

Planers

- 24"x24"x16 & 8' Gray Planers.
- 30"x30"x16" Gray.
- 36" Cincinnati Openside Planer Shaper, M.D.
- 48"x48"x12" Liberty Openside Planer, Three Heads. Excellent.

Shapers

- 16", 20" 24" Gould & Eberhard Cone Drive.
- 16", 20", 24", 28", 32", Gould & Eberhard S.P.D.
- 20" Steptoe, Timken bearing.
- 20" Columbia H.D. Cone.
- 24" Smith & Mills S.P.D.

Radial & Drill Presses

- 21" Cincinnati Bickford tapping attachment.
- 24" Cincinnati Bickford Tapping attachment.
- D.1 Colburn H.D. 20" four spindles Barnes.
- 3" American sensitive Cone.
- 3, 4 and 6" American Trip. Purp. Enclosed Hd.

Gear Cutters

- No. 1, 2, & 3 Adams Farwell Gear Hobbers.
- No. 6, 624 Fellows Gear Shapers.
- No. 12 Barber Colman Hobbers.
- 6, 11" Gleason Bevel Gear Generators.
- No. 6-60", 3-26", 4-36", 4-48" B & S Automatic.
- 80" Pfauter Hobber.

Milling Machines

- No. 5 B & S.
- 24" Cincinnati Automatic Plain Like New.
- No. 33 Kempsmith Plain Production M.D.
- No. 3-48" Garvin Duplex M.D.
- No. 4 B & S.
- No. 2 Cincinnati Plain.
- No. 2A Milwaukee Plain Mfg. S.P.D.
- No. 3 Cincinnati H.P. Univ. Div. Hd.
- No. 3 Kempsmith Univ. Cone.
- No. 4 Cincinnati Plain H.P. Cone.
- No. 4 Cincinnati Univ. H.P. Cone. Div. Hd.
- No. 4 Cincinnati H.P. Rect. O.A. S.P.D. Vert.

Grinders

- No. 3 Abrasive.
- No. 3 Ohio Universal Tool & Cutter.
- No. 4 Oliver Drill Grinder M.D.
- No. 51 Oliver Drill Grinder M.D.
- No. 2 Brown & Sharpe Surface, Mag. Chuck.
- 60" Blanchard M.D. Like new.
- 14" Pratt & Whitney b. b. Surface, Mag. Chuck.

- No. 78 Wilmarth & Morman Surf. Grdr., Belt.
- 3" Pratt & Whitney Surface.
- 30"x120" Landis Self Contained B1T. Drive.
- 6x18", 10"x36", 12"x36" Landis Self Contained.
- 12"x36" Bath Univ.
- No. 50, 55, 60, 65 Heald Internal.

Hammers

- No. 2 1/2 Mossberg & Granville Drop Hammer.
- 50 lbs. Little Giant.
- 65 lb. Champion Upright, Belt drive.

Tappers

- No. 1, No. 2, No. 2X, No. 2BG Garvin Autom.

Vertical Mills & Boring Mills

- No. 1 B & S Vertical, Cone drive.
- 42" Colburn Rapid Trav.
- No. 5B Becker Vertical Miller.

Pipe & Bolt Machines

- 1", 2" Acme Class A Bolt Cone.
- 2" Acme M.D.
- 2", 2 1/2", 3" Landis Bolt Cone.
- 1 1/2" and 2 1/4" Landis, leadscrew.
- 2" Landis Pipe.

Saws

- 6"x6" Peerless High Speed.
- 6x6 Racine Belt; No. 7 Atkins 6x8.
- No. 2 Klemm Metal Band Saw.

Shears

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- No. 14EF Pels Bar, Angle & T Shear, M.D.
- No. 2 Bethlehem Rotary Slitting Shear.

Brakes

- No. 184 Chicago Steel Bending Brake Arr. M.D.
- 8"x10 gauge.
- 6"x8" Capt. Dreis & Krump.

Riveters

- No. 1 1/2B, 4A, 2A HD. High Speed Riveters.
- No. 80, 80B Grant Rotary Spinners.

Presses

- No. 5 Consolidated Open Back Inclined.
- No. 5 Bliss Double Crank, Grd. Press.
- P3 Ferracute.
- K 15, 30 Ton Lucas Forcing.
- 150 Caldwell Hydraulic Wheel Press.
- 300 Ton Caldwell Hyd. Wheel Press.

Drills, Mult.

- No. 11, No. 12, No. 40 Natco 8 spindles.
- Footo Burt Mult. Spindle 32 spindles.

Turret Lathes

- 1 1/2" and 2" Acme Hand Screw Machines.
- No. 4 & 6 Warner & Swasey Plain, Bar Feed.
- No. 4 Gisholt Plain.
- 26" Libby Grd. Hd. 7" hollow spindle.
- 14"x19" Fay Automatic.
- No. 2A W & S., Timken, Serial over 320,000.

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- 2 1/2" Bar Universal S.P.D.
- No. 1 Niles Horizontal Taper type.
- No. 1, 2, 3 Barrett Horizontal.
- No. 1 Rockford.

Miscellaneous

- Fisher Oil Groover.
- No. 11 Dwight Slate Marking Machine.
- No. 12, No. 13 Pratt & Whitney Profilers.

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Gridley 4 spindle Model F, 14" and 24".
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Bullard 24" Rapid Production.
DRILLS, Mueller Plain Radial, 4", Motor Drive.
Western Plain Radial, 3", 5" & 8" Motor Drive.
GEAR HOBBERs, Barber-Colman Nos. 3 and 12.
Lees-Bradner Nos. 1 and 5A.
GEAR SHAPERS, Fellows Nos. 6 and 77A.
GRINDERS, Heald Nos. 55, 60, 65, 70, and 75.
B. & S. Universal No. 1 & 3.

Norton Plain, 6" x 32", 10" x 24, 36 & 50".
B. & S. No. 10, 11 & 14 Plain, S. C.
LATHES, American 16" x 6", GH, QC, TA, MD.
LeBlond 16" x 8" T. A. Pan Bed, M. D.
Springfield Ideal 18" x 8" T. A. M. D.
Niles, B. & P., 36" x 10", Triple Geared, MD.
MILLING MCHS. B. & S. No. 3 Vertical, M. D.
Van Norman No. 283 Duplex, M. D.
Hall Planetary Thread Mill, M. D.
Ingersoll 36" x 8" Open Side, Adj. Rail, M. D.
PRESSES, Ass't'd, O.B.I. to large Toggles.

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Nos. "I-B" K. & T. Dbl. Overarm Mill., A. C. M. D.
Nos. 3, 4 & 5 Cin., B. & S. & LeBlond Millers.
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No. 1 Diamond Surface Grinder, Magnetic Chuck.
14" P. & W. Vert. Grinder, M. D., Mag. Chuck.
16" x 8" Whitcomb-B. grd. head Lathe, nearly new.
24" Barnes, 4 Spindle Camel Back Drill.
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Motor Driven Press, 42" Between Uprights.
42"—60"—144" Vertical Boring Mills.

8' x 10 ga. D. & K. Leaf Type Pan Brake 8" Fingers,
Belt Drive.
12' x 12 ga. Toledo Squaring Shear, Motor Base.
6' American Radial (Not enc. head).
3 1/4" Acme Turret Lathe, cross slide, geared head.
Brown & Sharpe Planer Type Surface Grinder.
12' x 7 1/2" x 10" Sullivan two stage Compress, with
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72" x 48" x 14" American Planer, two heads.
30" x 30" x 10" Detrick & Harvey Planer, open side.
10" x 72" Norton Cylinder Grinder.

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3—250 ton — 1—100 ton

BRAND NEW CONDITION—AT 1/2 NEW PRICE. Watson—Stillman—self
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Coining Press; 1 1/2" stroke.
Bliss No. 79 1/2, Grd.; SS; Tierod
12" shaft; 10" stroke.
Bliss No. 55 Toggle; will draw and
lift out 10".
Bliss No. 306; Grd; SS; Tierod 6"
stroke; like new.
Consolidated No. 64; Pl; SS; 8"
str.; same 4" stroke.
Ferracute No. PG-4; Grd; Back
Flywheel; 2 1/2" stroke.
American Can. SS. Dble Cr.; Pl.;
Bed 36" x 30"; 100-ton cap; 2" str.

LATHES:

American 14x6'; Grd. Hd.; Pan;
Taper; Chuck; M. D.
Lodge & Shipley 16x6; Grd.; Hd.;
Pan; Chuck; MD; 12 speed.
Reed-Prentice 12x6. Grd. Hd.;
8 speed; SPD arr. M. D.; Pan.
Reed-Prentice 16x8 Grd. Hd.; 8
speed; SPD; Chuck.
Reed-Prentice 21x10; Grd. Hd.;
MD; 8 speed; Chuck.
Amer. 16x8; Cone Hd.; Renewed.
Lodge & Shipley 18x8; Cone Hd.
Bridgeford 26x14 Grd. Hd; Taper;
Chuck; 8 speed; M. D.

MILLERS:

Brown & S. No. 3 Vert.; M. D.
Cincinnati No. 3 Vert. High Pwr.
Brown & Sharpe No. 2 Vert.; MD.
Becker Vert. No. 5B; No. 5C; No. 6
B & S No. 1Y Taper Spdl; Cone.
Hendey No. 3 Plain.
Ohio No. 3 Plain.
Kempsmith No. 1; No. 2; No. 3 Pl
Cincinnati No. 3 & No. 2 Plain.
B&S No. 1 1/2 B & No. 2B hvy. pl. md.
Van Norman No. 2 & No. 1/2 dupl.
Bullard 24" Rapid Production.
Cincinnati No. 1 1/2 & No. 4 Univ.
Ohio No. 2 Univ; Bilton No. 25 Pl.

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No. 1 Cleveland, 2½" bar.
No. 3-A Universal, 3" bar.
No. 2 Rochester, 3" bar.
No. 1 Lambert, 3" bar.
No. 3 Hamilton, 4½" bar, Fl. Type.
5" bar N-B-P Floor Type.

BORING MILLS

No. 1-A Pratt & Whitney Jig Borer.
24", 36", 42" Bullard "New Era".
42", 48", 54", 60" Colburn.
30", 52", 62", 72" King.

DRILLS

1, 2, 3, 4, 6-spdl. Leland-Gifford.
1, 2, 3, 4, 6, 8-spdl. Henry & Wright.
No. 2 Colburn, 1, 2, 3, 4 Spindle.
No. 4 Colburn, 2 Spdl.
No. 14 Colburn, Motor Drive.
No. 2, No. 3 Defiance Hvy. Service.
Nos. 314, 416 Baker.
No. D-4 Colburn.
No. 1, No. 3, No. 4 Baush Multiple.
3½", 4" Western Plain Radial.
4" Fosdick Plain Radial.
4", 5" Cinn.-Bickford Plain Radial.
4"-5", 6" American Triple Purpose Radial.

GEAR CUTTERS

No. 4-36", No. 4-48" Brown & Sharpe.
No. 3-52" Plauter Hobber.
No. 6-60" Brown & Sharpe.
Nos. 6, 61, 615, 62 Fellows, Motor Drive.
No. 7 Fellows, Motor Drive, Late Type.
18" Gleason Tester & Lapper, Motor Drive.

GRINDERS

8"x18", 36" Cincinnati Plain, Saddle Type.
20"x168" Landis Pl., Motor Drive.
26"x96" Landis.
No. 2½ Universal (Bath Type).
No. 2 Brown & Sharpe Universal.
No. 4, No. 4-A Landis Universal.
No. 70 Heald Internal.
No. 10-16" Blanchard Vert. Surface.
No. 16-A Blanchard Auto. Vert. Surface.
No. 2-18"x6" Reid Surface (New).
No. 2-18", No. 6-26" Gardner B. B. Disc.

LATHES

14"x6" Hendey, Taper Attach.
14"x8" Le Blond Grd. Hd. motor drive.
16"x6", 8" Lodge & Shipley Sel. Grd. Hd.
17"x8", Le Blond Hvy. Duty Grd. Hd. M.D.
18"x6" Monarch Grd. Hd., Motor-in-Base.
18"x12" Lodge & Shipley.
19"x8" Le Blond Hvy. Duty Grd. Hd. M.D.
20"x14" Lodge & Shipley Sel. Grd. Hd.

NORTON MOTOR DRIVEN GRINDERS

6"x32"	14"x36"
10"x18"	14"x50"
10"x24"	14"x72"
10"x36"	14"x96"
10"x50"	16"x50"
10"x72"	16"x72"
	18"x96"

22¼"x120"

22"x12" Lodge & Shipley, multiple stops.
24"x12", 14", 16" Lodge & Shipley Sel. Geared Head.
24"x14", 16" American, Geared Head.
30"x11", 15" American, Geared Head.
30"x16" American, cone dr., taper attach.
33"-60"x16" Le Blond Geared Head Sliding Bed Gap Lathe.
36"x14", 20" Lodge & Shipley Sel. Grd. Hd.
66"x21" Putnam Triple Geared.

MILLERS

No. 2 Standard Milwaukee Pl., M.I.B.
No. 2, No. 3 Cincinnati, Plain.
No. 2-B, No. 3-B Milwaukee Pl., M.I.B.
No. 3-B, No. 4-B Hvy., Brown & Sharpe, Pl.
No. 4 Cincinnati, Plain.
No. 1½, No. 2 B. & S. Universal.
No. 3-B Milwaukee Universal.
No. 2, No. 3 Cincinnati H. P. Vertical.
No. 5-B, No. 6, No. C-2 Becker Vertical.
No. 5-48" Cincinnati Hydromatic.
6"x14", 6"x48" Pratt & Whitney Thread.
No. 4, No. 8 Lees-Bradner Thread.

PLANERS

30"x30"x6", 9", 18" Cincinnati.
30"x30"x14" Gray, reversing motor dr.
36"x36"x8", 12", 18" Cincinnati.
36"x36"x12" Gray Maximum Service, M.D.
36"x36"x14"-24" Cleveland Open Side.
42"x42"x14" Gray.
42"x42"x30" Niles-Bement-Pond, Rev. M.D.
48"x48"x10" Detrick & Harvey, Open Side.
72"x48"x10" Cincinnati.
72"x60"x16" American Widened Pattern.
72"x72"x16" Cincinnati M.D.

AUTOMATICS

No. 2-G Brown & Sharpe.
2¼", 3¼", 4¼" Gridley, Single Spindle.
1¼" Cleveland Model A", 1 Spdl.
1½" Model "C" National-Acme, Five Spdl.

TURRET LATHES

No. 5 Foster Univ. Tur., A. C. & W. F.
No. 1-B Foster Universal.
No. 2-A, 3-A Warner & Swasey.
No. 3 Cinn.-Acme, A. C. & B. F.
No. 4-A Warner & Swasey, 4¼" H.S.
No. 4-L Gisholt, 9¼" H. S., M. D.

HILL-CLARKE MACHINERY CO.

645 W. WASHINGTON BOULEVARD, CHICAGO

CHICAGO'S LARGEST STOCK OF ELECTRIC POWER EQUIPMENT

SPECIALS

- 1100, 571, 368, 340, and 80 CFM 100 lb. pressure motor driven air compressors.
 3—573 CFM 55 lb. pressure Gardner Denver air compressors.
 2nd Syntro type R60, 1 phase, 60 cycle, 110 volt electric hammer.
 600, 300, 200, 100, and 50 KW 250 volt DC synch. motor generator sets.

ARC WELDERS

- 1—500 Amp. Westinghouse constant potential.
 3—300 Amp. Lincoln portable, A. C. motors.
 4—200 Amp. Lincoln portable, A. C. motors.
 1—75 Amp. Lincoln portable, A. C. motor.
 1—17 KW Acme 15th throat spot welder.

Complete stock AC and DC motors, generators, M. G. sets, pumps, transformers, frequency changers, turbo generator sets, air compressors, etc.

Chicago Electric Co., 1330 W. Germak Road, Chicago.

HIGH GRADE MACHINE TOOLS

- 36th BULLARD VERTICAL TURRET LATHE—NEW ERA TYPE—MOTOR DRIVE.
 No. 31 LUCAS HORIZ. BORING MILL—M. D.
 No. 32 GIDDINGS & LEWIS HOR. BOR. MILL.
 Nos. 2B, 3B MILWAUKEE PLAIN MILLS, S.P.D.
 No. 2½ MILWAUKEE VERTICAL MILL, S.P.D.
 No. 2A WARNER & S. UNIV. TUR. LATHE.

- 3rd AMERICAN RADIAL DRILL, MTR. ON ARM.
 No. 4 BROWN & SHARPE UNIV. GRINDER.
 No. 55 TOLEDO PRESS—TIE ROD CONSTR.
 No. 6 TOLEDO INCLINABLE PUNCH PRESS.
 No. 24—53rd GARDNER HORIZ. DISC GRINDER.
 Nos. 3, 12 BARBER COLMAN GEAR HOBBSERS.
HUNDREDS OF OTHER MACHINE TOOLS IN STOCK.

Indianapolis Machinery & Supply Co., Inc.
 1959-69 SOUTH MERIDIAN STREET INDIANAPOLIS, INDIANA

McBRIDE & McCLENNEN

Trading As

DELTA EQUIPMENT CO.

MILLING MACHINES

- No. 1 Brown & Sharpe Universal.
 No. 1½ Brown & Sharpe Universal.
 No. 1½ Hendey Universal.
 No. 4 Cincinnati Universal.
 No. 1B Brown & Sharpe Plain.
 No. 2B Brown & Sharpe Plain.
 No. 3 LeBlond Plain.
 No. 4 Brown & Sharpe Plain.
HORIZONTAL BORING MILL
 No. 0 Giddings & Lewis, 3¼" Bar.

148 N. 3rd St.,

LATHES

- 26—48"x14" McCabe Double Spindle.
 24"x10" Bradford.
 20"x10" LeBlond.
 18"x12" Hendey.
 18"x10" Sidney.
 18"x8" Monarch.
 16"x10" Sebastian.
 16"x8" Monarch.
 14"x6" Monarch.
 13"x5" Willard.

Philadelphia, Pa.

JONES OFFERS

LATHES

- 14x6" Willard Grd. Hd., M. D.
 14x10" American Grd. Hd., M. D.
 16x8" Monarch Geared Hd., M. D.
 18x10" Boye & Emmes Cone Dr.
 30x10" American Cone Drive.
 32x12" Boye & Emmes Cone Dr.
 No. 2A Warner & S. Univ. Turret.

SHAPERS — PLANERS

- 21" Smith & Mills Cone Drive.
 16, 20 & 24" G. & E. Cone Drive.
 36x12" Cincinnati Planer 2 heads.

MILLERS

- No. 5B plain B. & S. epl. pulley.
 No. 4 LeBlond Plain, Cone Drive.
 No. 2B K. T. Plain S. P. Dr.
 No. 2B Plain B. & S. S. P. Drive.

PRESSES

- No. 6-H Toledo O. B. I.
 No. 6 Consolidated O. B. I.
 Toledo Nos. 90C & 92C dbl. crk.
 Toledo No. 56 Str. Side.
 Horning Presses—all sizes.

SHEARS

- 83"x¾" L. & A. 10" gap.
 66"x¼" L. & A. 6" gap.
 96"x10" Gauge Robinson.
 72"x14" Gauge Niagara.
 Nibbler—Gray ¾" cap.

MISCELLANEOUS

- 42" King vertical 2 heads.
 Boring Mill Horiz. 3" bar.
 Saws—9x9 Peerless M. D.
 3' and 4' Radial Drills.

THE JONES MACHINE TOOL CO.,

**FRONT & PIKE STREETS,
 CINCINNATI, OHIO**

REBUILT AND GUARANTEED

AUTOMATICS

1 1/2" & 1 3/4" cone.
1 3/4" & 3 1/2" Gridley.
5/8", 1", 1 1/4" & 2" Cleveland.
Nos. 24, 33, 34, 454 & C54 New Britain chucking.
No. 5A, GA Potter Johnston.
14" Fay.
8" & 12" Bullard Multiautomatic.
10" Bullard Continumatic.
18" Gisholt Simplimatics.

BROACHES

Footo Burt vertical surface.
No. 2S Lapointe hydraulic.
10 ton Metalwood hydraulic.
15 ton Oilgear hydraulic.
No. 3 Oilgear hydraulic.
No. 3 American rack.
No. 3 J. N. Lapointe double.
Nos. 6, 3, 4 Lapointe.
2 ton American vertical.

DIAMOND BORERS

No. 112 A Excello 2 spindle.
Coulter 1 & 2 Spindle vertical.

DRILLS

21", 24" & 28" Cincinnati.
No. 22", 24" Barnes all geared.
24" Barnes 4 spdl. all grd.
30" Snyder.
No. 121, 217, 314, 315, 321 Baker.
No. 2 Mfg. Colburn 1, 2, 3, 4 spdl.
Nasco multiple, Nos. 11, 12, C12, 13, C13, 14, B14 & 30.
Nos. 1 & 3 Bausch multiple.
No. 1 Pratt & Whitney gun.
6 spdl. Pratt & Whitney deep hole.
Nos. 6D, 11D & 16D Moline.
No. 10D Moline cylinder borer.
5 spdl. Detroit automatic.
Nos. 15 1/2 & 17 Foote Burt.
2 1/2" Morris radial.
3" American sensitive radial.
3" Dresses radial.
3" Clint. Bick. radial.
3 1/2", 4", 5" & 6" Western radial.
4" Mueller radial.
4" Hammond radial.
6" N.B.P. univ. radial.
Sensitive: All makes and sizes.

FORGING TOOLS

Nos. 25, 6 & 9 Williams & White ballzogs.
No. 5 I Nazei hammer.
No. 1A Ajax forge rolls.
1" National upsetter.
1", 1 1/2", 2" & 4" Ajax upsetters.
1 1/2" Acme upsetter.
3/4" No. 3 W. F. cold header.

GEAR CUTTERS

Nos. 12 Barber Colman.
Nos. 12HS, 18H & 24H G. & E.
Nos. 6, 7, 77A & 715 Fellows.
No. 5A Lees Bradner.
2 1/2" G. & E. spur & bevel.
38"x10" Newark automatic.
Nos. 3 & 4 B. & S. auto.

Lipe 2-spdl. chamferer.
Gleason quenching press.
No. 2 Bilton gear miller.

GRINDERS

No. 2 Cincinnati centerless.
No. 2 Helm centerless.
No. 72A3 Heald Sizematic.
Nos. 70 & 72 Heald internal.
No. 12 Bryant internal.
No. 3 Barber Colman hob.
16"x32" Norton crank.
10"x48" Landis crank.
No. 4 Brown & Sharpe univ.
Nos. 1, 2 & 2 1/2 Bath universal.
No. 16 Blanchard surface.
6"x30" No. 2 B. & S. surface.
6"x30" Norton surface.
12"x48" Springfield surface.
14"x48", No. 5 Abrasive surf.
20"x50" Safety Emery surf.
30"x84" Diamond face.
18", 24" & 30" Gardner disc.
Nos. 8 & 221 Badger disc.
No. 84 Gardner opp. disc.
No. 96 Gardner hydr. face.
8" Arter auto. piston ring.
12" Arter rotary surface.
Landis:—6"x18" to 16"x33".
Norton:—6"x32" to 14"x72".

ENGINE LATHES

14"x6" Reed Prentice grd. hd.
14"x6" & 16"x6" Monarch.
16"x6" Cicco geared head.
16"x9" Lehman geared head.
16"x8" & 16"x10" Lodge & Shipley geared head.
18"x6" & 20"x8" Hendey, taper & relieving att'm't.
20"x10" Reed Prentice grd. hd.
21"x18" Leblond heavy duty.
22"x10" Davis.
24"x14" American geared head.
24"x16" Schumacher Boye.
26"x12" Wickes.

LATHES, TURRET

Nos. 2, 2A, 3A, 4 & 6 W. & S.
Nos. 1B, 3 & 4 Foster.
18" Libby.
21" Gisholt.
1 1/2", 3 1/4" Cincinnati Acme.
2 1/2" No. 2 Acme universal.
24" Bullard vertical.

LATHES, MFG.

8" Sundstrand stub.
11"x4", 11"x6", 17"x6" Leblond.
17"x8", 20"x8" Wickes.
13"x6" Automatic threading.
26"x10" Leblond crankshaft.
Nos. 9 & 12 Leblond Multicut.

MILLERS

Nos. 2A, 2B & 3B Milwaukee.
Nos. 1 1/2", 2, 3 & 4 Cincinnati.
No. 1 1/2" Rockford univ.
No. 2 Brown & Sharpe vert.
No. 3 & 4 Cincinnati vert.
Size B1 Becker vertical.
No. 6 Becker vertical.
24"x48" Cincinnati; duplex.
24" & 48" Cincinnati automatic.
24" & 48" Newton rotary.
48" Ohio tilted offset.

Nos. 13B & 33 B. & S. Mfg.
No. 3 & 20 Sundstrand Right-mill.
66"x30"x8" Ingersoll adj. rail.
No. 4—36 Cincinnati Hydramatic.

BORING MILLS

24" Bullard, side head.
30" Bullard, single turret.
34" Colburn single turret.
38" Niles car wheel.
42" Bullard with side head.
42" King, 1 pl. & 1 turret hd.
42" Detrick & Harvey.
50" Bullard.
60" Gisholt.
3" Binsee horizontal.
3", No. 0 Giddings & Lewis.

PLANERS

24"x24"x6" Gray.
24" Cincinnati crank.
30"x30"x12" Cleveland upside.
32"x32"x12" Niles.
36"x30"x16" Cleveland upside.
42"x48"x12" Cleveland upside.
48"x30"x10" Liberty upside.

PRESSSES

No. 51 Cleveland OBI.
No. 5 Toledo OBI.
No. 7 Cleveland OBI.
71 & 88 ton Wat. Far. OBI.
No. 75 grd. Toledo openback.
No. 1 1/2 Bliss toggle draw.
No. 266 Consol. cam draw.
No. DDG 54 Ferracute cam.
600 ton Cleveland coining.
Nos. 55 1/2, 56, 56 1/2, Toledo.
Nos. 62, 64, 65, 66 Consolidated.
No. P4 and PG4 Ferracute.
No. EG35 Erie punching.
No. 41 & 41A Toledo horn.
No. 30 1/2 Bliss arc frame.
No. 7 Z. & H. percussion.
Nos. 23 & 25 1/2 Consol. horn.
No. 176A Consol. gap dbl. cr.
No. 00D50 Cleveland dbl. cr.

RIVETERS

High Speed:—Nos. 1 1/2B, 2A, 3A, 4A, 5A, 6B & 7B.
20 & 50 ton Allen air.

SAWS

6"x6" & 8"x8" Racine hand.
6"x6" Peerless shaping.
23" Newton cold saw.
10"x10" Napier band.

SHAPERS

7" Rhodes.
10" McMahon.
15" Potter & Johnston univ.
16" Cincinnati.
24" Gould & Eberhardt.
24" Cincinnati; shaper planer.
24" Potter & Johnston univ.

SLOTTERS

2 1/2" Garvin die.
18" Niles.
20" Betts, MD, PRT.

SHEET METAL TOOLS

N. Campbell rubber.
10"x16" Chicago brake.
4"x1 1/2" Niagara shear.

2100 Tools in Stock. Send for List.

MILES MACHINERY CO. SAGINAW, MICHIGAN

BORING MILLS, Horiz.

- 2 1/4" bar N.B.P., knee, M.D.
 3 1/4" G. & H. No. 32.
 4" bar Gisholt, knee, M.D.
 5" bar Niles fir. type; 6" NBP.

BORING MILLS, Vertical

- 30" Bullard Rapid. Pro.
 51" Bullard, Cone Drive.
 60" Gie., PRT.; 7-10" B. ext.

DRILLS, Radial

- 6", 7" Cincinnati.
 6" Reed-Prentice gear box m.d.
 4" American Triple Grd.
 4" Cincinnati Bickford.
 4 spin. Kokomo, 1 1/2", No. 3 M.T.

- 6" Mueller, gear box, m.d.
 6" American, univ. & plain.
 5, 4 & 6 Spindle Athens.
 4 spindle No. 2B Edlund.
 32" Cincinnati B., tapping, m.d.

GRINDERS

- 10"x30" Landis Plain (3).
 12"x32" No. 2 Landis Univ.
 12"x36" Landis Plain.
 16"x50" Norton Self Cont.
 26"x120" Landis Self Cont.
 No. 16 Blanchard, 26", belt.
 No. 11 Landis Tool & Cutter.
 No. 55, 60 and 65 Head Cyl.
 No. 70 Head Internal.
 14" P. & W. Surface M. D.
 No. 2 B. & S. Surface M. D.
 No. 13 B. & S. universal.

No. 193 Rivet Internal.**LATHES**

- 13"x6" Seneca Falls, t.a.
 14"x8" Cisco t.a., draw-in.
 14"x6" Monarch, q.c.g., cone.
 16"x12" South Bend.
 18"x8" Lodge & S., grd. hd.
 18"x8" Reed Prentice grd. hd.
 20"x10" Greaves Klusman.
 20"x10" Walcott, Cone.
 22"x8" Lodge & S., cone.
 24"x12" Putnam Q.C.G., cone.
 24"x16" Lodge & S., cone.
 24"x19" American L. C. G.
 28"x12" Schumacher Boye.
 28"x17" Chard, Grd. Hd.
 30"x18" Bridgeford turning.
 30"x20" L & S, Cone, T.A.
 32"x14" Bove & Ennes, Cone.
 32"x17" Fifield, triple grd.
 32"x22" Schumacher Boye.
 36"x16" LeBlond, cone, i.e.g.
 36"x22" Pond Grd. Hd. m.d.
 36"x42" LeBlond grd. hd.
 42"x18" Pittsburgh QCG Cone.
 42"x35" Putnam Grd. Hd., m.d.
 52"x20" Gleason, Cone.
 60"x23" Putnam, Cone.
 63"x36" Pittsburgh, Grd. Hd.
 72"x40" Putnam, Grd. Hd.
MILLERS, Production
 4" Pratt & Whitney Spine.
 18" Cin. auto. (8); 28" Cl. s.a.

MILLERS, Plain

- No. 1 Cincinnati, Cone, Univ.

- No. 5 Cincinnati Grd. Hd., P.R.T.
 No. 40 LeBlond, Genrad Hd.
 Nos. 3D & 2B Milwaukee.
 No. 2B Heavy B & S SPD.

MILLERS, Vertical

- Model B-1 Becker, table
 56"x12", feeds 44"x14"x14".
 Model B Becker, table 47"x12",
 feeds 36"x14"x14", S.P.D.
 Model C Becker, s.p.d.
 Model CS, Becker Continuous.
 No. 5B Bee, cone; No. 2 Knig.

PLANERS

- 84"x84"x18" N.B.P., M.D., 4
 72"x72"x14" Betts 4 hds.
 60"x60"x20" Pond, 4 heads.
 42"x36"x12" Gray.
 36"x36"x18" Sellers 4 heads.
 30"x36"x8" D. & H. Openside
 30"x30"x10" D. & H. Openside.
 30"x30"x8" Gray.
 24"x24"x6" Cincinnati.
 24" Lynd Farquhar Openside.

TURRET LATHES

- 1 1/2" & 2" P. & W's. (2).
 No. 2A W. & S. Univ.
 3 1/4"x36" Cincinnati Acme, Grd. Hd.
 No. 4 W. & S. Univ., Cone.
 No. 4 W. & S. Univ., grd. hd.
 No. 4 W. & S. cone, screw.
 No. 5 Foster, 1-13/16" bar.
 24" Gisholt, AC M/D, 3/4".
 21" Gisholt, AC M/D, 3/4".
 24" Gisholt Cone 5/4" H. S.
 2 1/4"x24" & 3"x36" J. & L.

BENNETT-RAFKIN MACHINE TOOL CO., Inc.

Offices: 30 CHURCH ST., NEW YORK CITY

IF WHAT YOU WANT ISN'T HERE Send Us Your Inquiry**DRILLS:**

- Radial, 3 ft. Feedick.
 Natco Type K 20-spld.
 Reil. Foote-Burn Nos. 2 & 4, 4 spld.
 Allen BB 5-spindle.
 Allen BB Type B spl. spld.
 Demco DAH BB, MD.
 26" Cincinnati BG PF SL.
 26" Baras BG PF SL.
 25" Bickford, G. E., American
 BG PF SL.
 20" & 24" Prentice BG.

GRINDERS:

- Cutter and Reamer, No. 1 Cinc.
 Cylindrical, 12x42", 10x30" Landis.
 Disc, No. 6--20 Besty.
 Disc, No. 220 Bader & press.
 Drill, New Yankee, D. E.
 Universal No. 2 B. S.
 Internal, Madison, Nos. 60 & 65
 Hawk.

HAMMERS:

- 50-lb. Little Giant BD.
 50-lb. Little Giant MD.
 40-lb. Bradley Helve.
 120 lb. Kane & Roach.

LATHES:

- 26"x12" Putnam Pacific type DBG,
 Semi-QCG, T. A. 26" Chuck.
 18"x8 1/2" Rahn & Mayer.
 18"x8" Lodge & Shipley MD.
 17"x8" Sidney DBG QCG.

LATHES-Turret:

- 16" Type A Gisholt, 6 1/4" hole.
 21" Type H, Gisholt, 3 1/2" hole.
 24" Type I, Gisholt, 4 1/2" hole.
 24" Type I, Gisholt, 4 1/2" hole.
 No. 4 Bardon & Oliver 1 1/2" cap.,
 b. s. and p. f. to turret.

MILLERS:

- No. 1-B Kearney & Trecker Plain.
 No. 2 LeBlond, plain, M. D.
 Nos. 2 & 3 Kemsmith, plain.
 No. 12 Brainard, Univ. Div. Hd.

PRESSES:

- Hydraulic, 42-ton Elmes.

OBI, No. 0, 4 1/2 Lashbough-Jordan

Str. Side, No. 7 Z & H, geared.

PUNCHES & SHEARS:

- Queen City DE, 1/2 in 1/4", M. D.
 Rock River L, 1/2 in 1/4", 24 thr.
 Cleveland C. SE, 1/4 in 1/4", 26" thr.
 No. L-10 Badger, DE, 1/2 in 1/4",

SHAPERS:

- 20" Smith & Mills BG.
 20" Cincinnati, traveling head, MD.
 Jig, GEM, 18 ga. cap., M.D.
 Rotary Bevel, Lennox 3/4".

Square, Stark 9"; 18 ga. cap.**Square, 52" Niagara, gap, 16 ga.****THREADERS, Pipe & Bolt:****Acme 1 1/4", dbl. head, belt.****Murphy, 3/4", dbl. head, belt.****Pipe, 2 1/2" Oster M. D.****MISCELLANEOUS:****Compressor, H-B CCB, 14x9x8,****20 HP motor.****Die Filer, Oliver S-1 M. D.****Planer, 42"x42"x18" Putnam.****Profiler, Reed-Prentice, 2-spindle.****MACHINERY COMPANY**

2333 N. 9th Street St. Louis, Mo.

VICTOR'S BARGAINS IN NEW EXPANSION REAMERS



	Whole Length	Length of Flute	Our Price
¾	4	1½	\$1.20
9/32	4	1½	1.24
5/16	4	1½	1.24
11/32	4	1½	1.28
3/8	5	2	1.28
13/32	5	2	1.32
7/16	5	2	1.32
15/32	5	2	1.36
1/2	6	2½	1.36
17/32	6	2½	1.46
9/16	6	2½	1.46
19/32	6	2½	1.60
5/8	7	3	1.60
21/32	7	3	1.76
11/16	7	3	1.76
23/32	7	3	1.92
3/4	8	3½	1.92
25/32	8	3½	2.10
13/16	8	3½	2.10
27/32	8	3½	2.30
7/8	9	4	2.30
29/32	9	4	2.50
15/16	9	4	2.50
31/32	9	4	2.70
1	10	4½	2.70

	Whole Length	Length of Flute	Our Price
1 1/32	10	4½	\$2.90
1 1/16	10	4½	2.90
1 3/32	10	4½	3.10
1 1/8	10½	4½	3.10
1 5/32	10½	4½	3.32
1 3/16	10½	4½	3.32
1 7/32	10½	4½	3.56
1 1/4	11	5	3.56
1 9/32	11	5	3.80
1 5/16	11	5	3.80
1 11/32	11	5	4.20
1 3/8	11½	5½	4.20
1 13/32	11½	5½	4.60
1 7/16	11½	5½	4.60
1 15/32	11½	5½	5.00
1 1/2	12	5½	5.00
1 9/16	12	5½	5.20
1 5/8	12½	5½	5.40
1 11/16	12½	5½	5.60
1 3/4	13	6	5.80
1 13/16	13	6	6.00
1 7/8	13½	6½	6.20
1 15/16	13½	6½	6.40
2	14	6½	6.60

SEND FOR OUR GENERAL CATALOGUE

VICTOR MACHINERY EXCHANGE
251 CENTRE ST., NEW YORK CITY

**No. 14 Cochrane-Bly Duplex Universal Vertical Miller-Shaper.
No. 4B K. & T. Pl. Milling Machine double overarm, motor-in-base, T. B.
No. 1A Warner & Swasey Turret Lathe, Tim. Bear., M. D.**

ARBOR PRESSES
No. 5 Greenerd, power.
AUTOMATICS
Nos. 9, 96, 96-G Brown & Sharpe.
3" Cleveland, Model B.

BAND SAWS, METAL
No. 1 Klem; 10"x10" Napier.

BRAKE
4 ft. Chicago, box and pan.

DRILL PRESSES
20" to 28" Barnes & Milwaukee.
No. 2 Avey, arr. M. D.; 12" over-hg.
1 & 2 spindle, Allen, M. D., B. B.
3 spindle, Leland-G., B. B., motor
and p. l., on each spindle, 12"
overhang, No. 4 taper.

4 spindle No. 3 Avey, arr. M. D., B. B.
4 spindle Leland-Gifford, p. f.
6 spindle Kerns B. B., M. D.
tapping attach. on each spindle.

GRINDERS
No. 11 Brown & Sharpe, M. D.
No. 22 Heald, Rotary Surf. M. D.
No. 12 B. & S., Universal Tool.
Disc. No. 4 & 6 Gardner, B. B.;
26" Badger, B. B.

Surface, No. 2 Reid, M. D.
GEAR HOBBSERS
No. 12-H Gould & Eberhardt.
No. 960 Pfauter Chemnitz.

HACK SAWS
6x6" Peerless Univ. Shap. M. D.
6x6" & 9x6" Racine.

LATHES
12"x5" Hendey, Grd. Hd., M. D.
14", 16", 18" Hendey.
14"x6" & 16"x6" Bradford.
14"x8" American, Grd. Hd., M. D.
14"x8" & 20"x8" American.
20"x9" & 28"x11" Hamilton.
20"x10" & 24"x12" Schumacher.
32"x16" S. & B. & E. q. c. g.

MILLING MACHINES
Duplex No. 34 Pratt & Whitney.
Automatics, 5" Pratt & Whitney.
Hand, No. 6 Whitney; No. 1 U. S.
Plain No. 1 Knight; No. 15 Valley
City; No. 2 Rock, SPD; No. 2BS
Milw., SPD; No. 2 YB B. & S.,
M. D.

Universal, No. 2A B. & S. M. D.;
Nos. 1 & 2 Kempa.; No. 35 Ohio;
Vertical No. 3-H & 4-B Becker;

NIBBLERS
Nos. 1 & 1B Campbell, 6 & 24" thr.

PLANERS
42"x42"x14" Hamilton.

PLATING GENERATOR
1500 amp. Chaudysson, Direct
connected to Synchronism motor.

PRESSES
Cam Drawing, No. 1 Bliss b. g.
Horn, No. 16 & 4A Bliss.
O. R. I., Nos. 1, R. & K.; 3 & 5A.
Toledo; No. 16, Stoll, M. D.

PUNCH & SHEARS
Nos. 33 & 35 Beloit.

RADIAL DRILL
3" Bickford, M. D.

SAW
No. 2 Ryerson Friction, M. D.

SHAPERS
16" & 21" Milwaukee B. G.
16" & 20" G. & E., B. G.

24" Amer., 34" Stockbridge, M. D.
SHEAR

3'-10 ga. Niagara power square.

TURRET LATHES
No. 2A Warner & S. Bar Feed.
No. 4 W. & S. plain.

THREAD MILLER
4"x12" Pratt & Whitney.

WELDERS
Arc: 200 Amperes U.S.L.
Butt: 15 K. W. Toledo.

Spot: 5 KW Dyer; 25 KW Toledo

**VICTOR MACHINERY CO. 130-132 South Clinton St.,
Chicago, Illinois**

Guaranteed MACHINE TOOLS

VISIT US AT OUR NEW AND LARGER QUARTERS

This Is Partial Listing. Pictures of Machines Listed Sent on Request.

GEAR MACHINES
2-5-A-C Lees-Bradner Gr. Hobbers.
2-4x36 Brown & Sharpe.
No. 12 Barber-Col. sgl. & dbl. overarm.

DRILLS AND RADIALS
21", 24" & 36" Cin. with and without
tapping attachment.

H. S. drills, 1, 2, 3 & 4 spdl., hand
and power feed, Leland & Gifford,
Fiedick, Edlund, Avey, etc.

D3 Colburn single spindle.

No. 2 L. & G. motor in head, adj.
for drilling on angles.

4" Hammond Radial Jack-Knife Type,
tapping attachment.

Nos. 216 and 217 Baker Drills, M. D.
C13H Natche hvd., drilling area of hd.
16"x20", bored bored for 24 spindles.

No. 13 & 14 Natche mult. rect. head.

PUNCH PRESSES
8-ton General Flexible Power Press.
No. 4 Cons. O. B. I. b. dr., 3" stroke.
No. 4A Bliss Horning, without table.
No. 36 Nias., flywheel in bk, arr. m. d.
306 Bliss geared 8" stroke.
95 Consolidated Flywheel.

MILLING MACHINES

No. 2B Brown & Sharpe Plain, M. D.
18", 24" & 48" Cin. duplex, std. and
widened pat.

Type B Godley & Edlund Production.
No. 15 Garvin Vertical.

GRINDERS

22" Pratt & Whitney Vertical.
No. 33 Abrasive, magnetic chuck.
No. 70A Heald Internal, 3 motors.
No. 3 Wilmarth & Morman Sur. B. D.
Cin. face mill, cap. 24" diam, M. D.
No. 70 Heald int. belt & motor drive.
64A Gardner Disc, 2 opposed wheels.
64" Diamond Face, M. D.
No. 10 & No. 11 B & S. Pl., M. D.
Fitchburg semi-automatic Spline shaft.

**SCREW MACHINES
AND AUTOMATICS**

No. 2A Warner & S. Univ., Serial
No. 197,000, 3 Jaw Air Chuck.
No. 4 Warner & S. Univ., C. D.
716 Model G Gridley, 4 spdl, m. d. (2)

No. 4 Brown & Sharpe Hand.
No. 6 Warner & Swasey Power feed
to turret and cross slide.
Cleveland Model 76" to 1 1/2", 4 spdl.
with mag. feed, M. D.
4 1/4 Single Spindle Gridley.

BORING MILLS

No. 31 & 43 Lucas Horizontal.

MISCELLANEOUS

Butt welder, Federal, 75 kw., 60 cy.,
3 ph., 440 v., 3 1/2" tubing capacity.
No. 3 Oilgear Horizontal Broach.
Double spdl. Landis bolt threader 1 1/2".
Filing machine, No. 3 Thiel.
Hammers, No. 4-A & 5-A high speed.
Honning machine, Footbust, sgl. spindle.
Jig borers, No. 2 & No. 3B Pratt & W.
Lathe, 16"x8" Monarch, g. h., m. d.
Lathe, 17" LeBlond Prod., g. h., m. d.
Mill band saw, Nos. 1 & 2 Klemm.
Saw, c. id, 4-B Cochran & Bly.
Swedging machine, No. 5 Langelier.

International Machinery Company
3131 East Jefferson Ave., Detroit, Michigan

— DALITZ MACHINERY AND TOOL BARGAINS —

THE MACHINERY TOOLS AND MISCELLANEOUS ITEMS LISTED BELOW ARE NEW, SLIGHTLY USED OR REBUILT BY EXPERTS. I CHALLENGE ANY ONE TO DUPLICATE THE VALUES OFFERED AT DOUBLE THE PRICE LISTED.

LAST CALL

SUBJECT TO PRIOR SALE

JONES & LAMSON TURRET LATHE, Single Pulley Drive, Steel Gears 11 Turret attachments including Size 4 Hartness Die Head. This Machine reconditioned at cost of \$1100, our price **\$600.00** Serial No. M 140-4639.

NORTON GRINDER Serial No. 1456, 32"x6" in fine shape **\$260.00**

PRATT & WHITNEY VERTICAL MILL No. 2 with 10" full rotary Vise **\$125.00**

KELLER MECHANICAL ENGRAVING MACHINE No. E-3, Work Table 22"x32". This **\$180.00**

Machine in fine condition, complete less motors

Two, LONG-ALSTATTER PUNCH PRESSES No. 6; One Machine New, the other slightly **\$100.00**

used New Machine **\$125.00** Used Machine

HENDEY MILLING & BORING MACHINE No. 10 B. & S. Arbor, Table 36"x14"—6 Q. C. **\$175.00**

Gear Speeds, This Machine like new. A buy at **\$ 75.00**

BILTON GEAR MILL Cap. to 6". Complete in good shape. **\$ 75.00**

REAL BARGAINS IN SMALL TOOLS. ALL NEW, UNUSED.

ARMSTRONG TOOL HOLDERS No. 6-S, 3/4" list \$13.50, our price **\$ 2.50**

PEERLESS H. S., S. Shank Solid Chucking Reamers **\$ 2.00**

McCROSKY Super Chucking Reamers H. S. Adjustable 2 3/4" Each **\$ 4.00**

RELIANCE Adjustable Angle Plates, 4"x6" 180 Degree adjustment ground all over for **\$ 30.00**

accuracy. Reg. net price \$54, our price

NEW L-W UNIVERSAL DIVIDING HEAD \$82.00. NEW L-W MAGNETIC CHUCK **\$ 42.00**

Working Surface 6 1/2"x18" 110 or 220V, our price

SPECIAL—We have on hand two FAIRBANKS MORSE 2" CENTRIFUGAL WATER **\$ 42.00**

PUMPS complete with 15 H.P. 3 Ph. 220V B.B. Motors and ALLEN BRADLEY automatic

Switches. These Pumps are guaranteed to be in A-1 condition Serial No. 161305 and

161306 Price Each **\$250.00**

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Simmons-Rebuilt-Guaranteed

16—26' Ex. Hy. Niles Vertical Boring Mill.

10—16' Niles Ex. Type Vert. Boring Mill.

10' Niles-B-Pond Hvy. Duty Vert. Bor. Mill.

No. 21 Landis Horizontal Boring Mill.

No. 3A Landis Horizontal Boring Mill.

No. 3A Universal Hor. Bor. & Dr. Machine.

No. 40 Landis Floor Type Horizontal Mill.

4" Bar D & H Floor Type Mill.

6 1/2" Bar D & H Floor Type Mill.

55" Starnets Boring & Turning Lathes. (NEW)

48" Fulton Boring & Turning Lathes.

109"x50' N-B-P Hvy. Duty Grd. Hd. Lathes.

96"x46 1/2' N-B-P Heavy. Duty G. H. Lathe.

84"x29' N-B-P Heavy Duty G. H. Lathe.

14'x10'x10' Bement-Miles Planer, 4-Heads.

92"x87"x42' N-B-P Planer, 4-Heads.

10' 6" Ohls Power Press Brake.

40" Wickes Pyramid Bending Rolls, Drop End.

100" Gould & Eberhardt Horiz. Gr. Hobber.

No. 36-H Gould-Eberhardt Auto. Gr. Hob.

No. 36-BM Gould-E. Spur & Bevel Mach.

32" Cincinnati Hy. Duty Shaper, Rapid Trav.

32" Ohio Dreadnaught Hy. Duty Shaper, MD

32" Gould-E. Hy. Duty Shaper, Ex. Base.

Over 2000 other machine tools, all sizes, types in stock ready for your selection.

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SOLD WITH AN ABSOLUTE GUARANTEE OF SATISFACTION

AUTOMATICS, Cone. (12) $\frac{1}{8}$ ", $1\frac{1}{4}$ ", $1\frac{1}{2}$ ", $3\frac{1}{4}$ " M. D. late type.
GRINDER, No. 33 ABRASIVE SURFACE MOTOR IN BASE.
GRINDERS, No. 2, No. 3, No. 13 Brown & Sharpe Universal.
GRINDER, No. 16 Blanchard 30" Magnetic Chuck Belted Motor Driven.
HOBBER, Gear No. 16 Hi-Speed Gould & Eberhardt.
LATHES, Turret No. 1A, No. 2A, No. 6 Geared Head, Warner & Swasey, Motor Drive.
LATHE, 34"x12" Reed Prentice, Geared Head, T. A.
MILL, No. 35 Cincinnati Universal, Vertical and Dividing Heads, Single Pulley Drive.
NIBBLER, Gray 34" throat 3/16" capacity.
OIL GROOVER, Wicaco, Vertical type.
PLANER, 36"x36"x14" Liberty 3 heads, Box Table, Motor Driven.
PLANER, 60"x60"x12" Niles Bement Pond Box Table.
PRESS, No. 17 Bliss Gap Frame Double Crank 5" Stroke, Bed 20"x97".
RADIAL, American 3' Sensitive Hi Speed, Motor on Arm.
RADIAL, American 5' Triple purpose, Motor Driven.
SEPARATOR, Chip Mackenzie, M. D. late type M. D.
SHEAR, No. 2132 Stoll, 132" 14 gauge cap. city Motor Driven.
SLOTTER, 16" Betts Motor Driven, Lates Type, Rapid Traverse.
SWAGER, No. 6 H. S. Langelier.
TAPPERS, National Bent Shank, $\frac{1}{2}$ " Capacity.
WELDERS, SPOT, SEAM & BUTT, 100 to 200 KVA Projection.

And a complete stock of fine up to date machine tools and equipment.

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- 1-BLANCHARD No. 16 Grinder, 26" chuck, belt drive.
- 1-NORTON Open Side Surface Grinder, 6"x10"x36", Motor Driven.
- 1-NORTON 3"x18" Plain Cylindrical Grinder, Self-Contained. Single Pulley Drive.
- 2-BROWN & SHARPE No. 2 YB Plain Millers, A. C. Motor Drive.
- 2-BROWN & SHARPE No. 2 B Heavy Plain Millers, A. C. Motor Drive.
- 2-CINCINNATI No. 3 Plain Millers, High Power, Large Pulley. All Feeds
- 1-CINCINNATI No. 3 Plain Miller, Rectangular Over arm, Motor in base.
- 1-CINCINNATI No. 4 Plain Miller, Rectangular Over arm, Motor Drive.
- 1-SHUSTER Wire Straightener, $\frac{3}{8}$ "x10" capacity.
- 1-LODGE & SHIPLEY 20"x10" geared head, motor drive or single pulley.
- 2-FITCHBURG Low Swing Lathes, geared head, S. P. D., 5"x5" centers.
- 1-HAMMOND 4 ft. Jack Knife Type Sensitive Radial, Motor Drive.
- 1-16" CINCINNATI Gear Hobber, Single Pulley Drive.
- 1-REED PRENTICE 5' Radial, Motor Drive.
- 3-CINCINNATI-BICKFORD 3 ft. Radials, Single Pulley Drive.
- 1-PRATT & WHITNEY No. 13 Multiple Spindle Drill Press, rectangular head.
- 1-GOULD & EBERHARDT 24" Cone Drive Crank Shaper.
- 1-CLEVELAND 2 $\frac{3}{4}$ " Automatic Model A.
- 1-BROWN & SHARPE No. 4 Hand Screw Machine, Countershaft Drive.
- 1-NILES-BEMENT-POND 42" Vertical Boring Mill, 2 Heads, gear box, S. P. D.

Other just as desirable tools in our large stock. Your inquiries requested.

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97 Chestnut Street

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GUARANTEED

DRILLS

No. 2 Avey, arr. m. d. 12" overh.
No. 2, 4-spindle Aveyomatics.
No. C-5 Natco, 10 spindles.
1, 2, 3, 4 & 5 sp. Allen, h.s., b.b.
3 spdl. Allen No. 2 M. T., p. f.
4 spindle L-G No. 2 M. T., p. f.
26" Barnes, sldg. head, tap. att.
51" Drees Univ. rad., arr. m. d.
3 1/2" Fosdick rad. gr. box s.p.d.

GEAR HOBBER

No. 12 B-C sgl. & dbl. overarm.
No. 3 Barber Colman, m. d.
No. 1/2 Schuchardt & Schutte.

GRINDERS

No. 25 Heald, hyd. rotary surf.
No. 20 Heald rotary surface.
No. 72 Heald int., hydraulic.
No. 2 Gardner disc, 18", disc pr
No. 2 B & S surf. m. d. & b. d.
No. 2-l B. & S. universal, m. d.
Nos. 1-2 B. & S. univ., 3 mtrs.
No. 11 Brown & S. plain, m. d.
12"x36" Thompson, univ., m. d.
No. 2 Norton univ. tool & cut.
No. 1 Cincinnati tool & cutter.

LATHES

No. 2A W & S Univ. Hex. Tur.
14"x6" Hendey, q. c. g.
14"x6" LeBlond, q. c. g., t. a.

15"x6" C. & J. c. hd, q. c. g., new.
16"x6" C. & J., grd. hd., Timken
Bearing, motor in base, new.
16"x6" South B., q. c. g., t. a.
16"x8" Monarch grd. hd. Tim-
ken Bearing, Taper Attach.
16"-24"x10" S. B. Gap, q. c. g.
18"x8" Hendey, q. c. g.
18"x8" B. & E., q. c. g., t. a.
18"-26"x8" S. B. Gap, q. c. g.
20"x9" Hamilton, q. c. g.
20"x10" Schu., Boye & E., q. c. g.
24"x12" Schum. B. q. c. g., t. a.
28"x11" Hamilton q. c. g., t. a.
32"-44"x16" Schu. B. q. c. g.

SCREW MACHINES

No. 2 Bardons-Oliver, hand.
No. 11 B & S Hand screw, m. d.
No. 1 B & S Hand screw, m. d.
No. 0 B & S Hand screw, m. d.

MILLING MACHINES

No. 1 B. & S. Plain, cone head.
No. 2, Van Norman Sub Head.
No. 2, B. & S. Plain, cone head.
No. 2Y, B. & S. Pl., mtr. drive.
No. 2A B. & S. Univ. motor dr.
and s. p. d.
No. 2B, Brown & S. plain, m. d.
No. 6 Whitney hand, motor dr.
4 1/2"x12" Pratt & Whitney thrd.

No. 214 Rockford universal.
Model "B" Becker, h. p., vert.
No. 4B Becker, vert., b.b., spdl.
No. 3 Becker vertical.
No. 1M Cincinnati, vert., s. p. d.
No. 4 Hendey Norton Pl. S. P. D.

PRESSES

No. 306 Bliss Strt. Side, Spie.
Crank, Tie Rod Const. 8" Strk.
No. 95 Bliss Gap Frame.
No. 4A Bliss horn, 4" stroke.
No. 13 Toledo Grd. horn, 1.1.
No. 1 & 1 1/2 Bliss Cam Dr., grd.
No. 6 Fox "Superflex".
No. 18 Bliss, o. b. i., arr. m. d.
No. 1 to 8 Rockford o. b. i. new.
No. 1 Loshough J., o. b. i.

MISCELLANEOUS

Bolt Cut. 1 1/2" Landis Id. ac 2 hds.
Bolt Cut. 2 1/2" Landis Lead Ser.
Broach, No. 3 Oilger.
Die filer, No. 5 Rearwin, m. d.
Die filer, No. 5 Thiel, motor dr.
No. 2 Grant Riv. Ham., 1/2" cap.
Keyseater, No. 0 Baker, 1" cap.
Keyseater, No. 2 Davis, 1/2" cap.
Saw, 6 x 6" Peerless universal
shaping, motor drive.
Saw, 9x9" Peerless, high speed.
Tapper, No. 1 Garvin, b.b., m. d.

GEO. M. BERNSTEIN & CO.,

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:- MILLING AND DRILLING MACHINES :-

No. 3 Cincinnati. Univ. Miller, M. D.
No. 1 Knight Drill. & Mill. Mach., M. D.
No. 2 Knight Drill. & Mill. Mach., M. D.
No. 2 Kempsmith Pl. Maxi. Miller, M. D.
No. 2 Cincinnati Slot. Spdl. Pl. Miller M. D.
No. 3 Cincinnati Slot. Spdl. Pl. Miller, M. D.
No. 3B Milwaukee Sl. Spdl. Pl. Miller, M. D.
No. 3B B. & S. Pl. Mill Tap. Nose Spdl. M. D.
No. 4B Hvy. B. & S. Sl. Spdl. Pl. Miller, M. D.
No. 4 Cincinnati Sl. Spdl. Pl. Miller, M. D.
No. 4B Cincinnati Sl. Spdl. Pl. Miller, M. D.
No. 5 Cincinnati Sl. Spdl. Pl. Miller, M. D.
No. 5 Cincinnati Rec. Arm Pl. Miller, M. D.
No. 5 Cincinnati. Vert. Miller, M. D.
No. 3B Milwaukee Vert. Mill., Minb.
No. 4B Becker Vert. Mill., Cone Drive.
18" Cinic. Single automatic Mill, M. D.
No. 4-48 Cincinnati. Duplex Auto. Mill, M. D.
No. 33 Kempsmith Mfg. Mill, Stad. Spdl., M. D.
48" Newton Dbl. Spind. Cont. Miller.

3 1/2" Western Pl. Radial Drill, M. D.
5" Amer. 14" Col. Plain Radial, Enc. Head.
6" Cincinnati-Bick. Pl. Radial Gr. Box, M. D.
6" American 16" Col. M. on Arm.
6" Mueller Gr. Box Plain Radial Drill.
6" Prentice Plain Radial, Cone Drive.
3" Carlton Hi-Speed Sensitive Radial.
4" Hammond Sensitive Radial Drill.
C12 Natco Rect. Head. Multiple Drill.
No. 13 Natco Rect. Head Multiple Drill.
No. 14 Natco Rect. Head Multiple Drill.
No. 30 Natco Rect. Head Multiple Drill.
No. 60 Natco 3-way Multiple Drill.
20" Bickford 4-spdl. P. F. Gang Drill.
3-spdl. No. 2 Colburn Heavy Duty Mfg. Drill.
No. 217 Baker Single Spindle Heavy Duty Drill.
No. D2 Colburn Sgl. Spindle Heavy Duty Drill.
No. 2D Minster Single Heavy Duty Drill.
No. 314 Baker Single Spindle Heavy Duty Drill.
7-spdl. Foote-Burt No. 2 Gang Drill.

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Your inquiries will be appreciated.

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REASONABLY PRICED TOOLS

D-31 FOX MULTIPLE DRILL, RECT. HEAD, 16"x31½" spindle centers. Bored for 36 spindles. Has ten 1¼ No. 2 Taper spindles. Power feed to head.

AUTOMATICS, Several Model A Cleavelands, from ½" to 3¾" bar capacity.

BOLT CUTTER, 1¼" Acme single, class A; 2" Landis.

DRILLS, 36" Cincinnati back geared, sliding head, tapping attachment.

24" Edlund Production 1¼" cap. power feed; No. 12 Minster H. D.;

2—Spindle 20" Barnes All Geared Self Oiling M. D., 24" Barnes all geared.

3—Spindle 20" Barnes All Geared Self Oiling belt drive; No. 314 Baker heavy.

GRINDERS, 14"x72" Norton Plain; 12"x72" Landis M. D.; No. 78 W. & M. Surf. M; D.

LATHES, 38"x14" Fifeild—Cheap; 18"x8" Greaves-Klusman double b. g., quick change.

MILLERS, No. 2B Brown & Sharpe plain, single pulley drive; No. 6 Becker Vertical with ball bearing countershaft; No. 3 Milwaukee Plain, Timken Bearings, Vertical Head, Rapid Traverse, Motor in Base; No. ½ Van Norman, 8" P & W Automatic. No. 1½ Cincinnati plain.

PLANERS, 30"x30"x8" Cincinnati, two heads on rail; 36"x15" Betts, 2 heads.

PRESSES, O. B. I.—No. 105 Bliss Consolidated, dbl. crk. incl., flywh. type, arr. for motor.

No. 2 Rockford 3" stroke; No. 3 and 4 Walsh; No. 2½ Robinson.

No. 72 Atlas power screw press, 36" between col, 30 ton cap.

RADIAL DRILL, 3" Prentice, gear box drive; 3" Cincinnati Bickford gr. box drive.

SCREW MACHINES, No. 4 Warner & Swasey univ. cone head, also plain screw machine.

No. 1 Brown & Sharpe wire feed; No. 4 Milholland.

Many other tools—exceptional "buys"—write for full details.

A. D. White Mchy. Co., 108 N. Jefferson St., Chicago, Ill.

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YOUR SURPLUS MACHINE TOOL EQUIPMENT

We will pay cash for your surplus machine tools and shop equipment. We have representatives all over the country who will be glad to inspect your surplus machines and give you an offer, without charge or obligation.

Write giving full details to

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SELECT *Inland* TOOLS

Milling & Shaping Mach. No. 14 Duplex Cochrane-Bly Univ. Motor Dr. Grinder, 18" Persons-Arter rotary surface, magnetic chuck, power feed
Grinder, No. 22 Heald rotary surface, 13" magnetic chuck, power feed.

Automatic, No. 00G Brown & S., m. d.
Automatic, 1/2" Cleveland, fully equipped.
Drill, 6 spdl, Kerns b. b. tapping att. m. d.
Grinder, No. 6 Gardner b. b. disc., univ. tables.
Grinders, (2) No. 1 W & M hand surf. b. b. spdl.
Grinders, hand surface, 36x7 1/2 Manhattan.
Lathe, 14x6 American grd. head, m. d., collets.
Engine lathes, 14x6 and 16x8 Monarch, q. c. g.
Engine lathes, 14x6 Bradford, pan bed, collets, tap. attachment.
Engine lathe, 16x6 Bradford, q. c. g., d. b. g.
Engine lathe, 16x10 Bradford, q. c. g., tap. att.
Engine lathe, 24x12 Lodge & Shipley, q. c. g.
Milling machine, No. 2 1/2 Rockford plain.
Milling machine, No. 3 Becker vert.
Planers, Pease, 20"x20"x5'; 24"x24"x6'.

Plating generator, 1500 amp. Chandeysson, 6 v., sync. m. d., prac. new.
Presses, o. b. i., (7) No. 2 Marshalltown 2 1/2" stroke, practically new.
Presses, horn, No. 2 Swain, pract. new.
Presses, horn, No. 16 Bliss.
Press, No. 3 Toledo, o. b. i.
Press, No. 5A Toledo, o. b. i., 3" stroke.
Press, No. 3A Willard, o. b. i.
Press, No. 5 Stoll, o. b. i., m. d.
Presses, No. 19 1/2 and 20 Bliss, o. b. i.
Punch press, No. 5 Stoll o. b. i., m. d.
Saw, 6x6 Racine, shear cut, h. a. prod., m. d.
Screw mche., 1" cap., Millholland, hand.
Wire straightener, Wells 7/8" cap.

Over 50 o. b. i. punch presses in stock.

We purchase your idle machinery for cash—Single machines or complete plants.

Inland Machinery Company

41 So. Clinton St.,

Chicago, Ill.

EXCEPTIONAL TOOL VALUES

VERTICAL BORING MILLS

100" N.-B.-P.; 2 swivel hds.; Power Rap. Trav. M. D.
 48" Colburn; 2 swivel heads; S. P. D.
 42" Bullard; 2 swivel heads; S. P. D.; Pwr. Rap. Trav.
 42" Kins; 2 swivel hds.; Power Rapid Traverse; M. D.
 38" Bullard; 2 swivel heads; Belt Drive.

HORIZONTAL BORING MILL

48" bar N.-B.-P., Table Type, Duplex Control; M. D.

LATHES

36"x17' Houston, Stanwood & Gamble; Belt Drive.
 28"x20' Walcott; Belt Drive.
 12"x8' Lodge & Shipley; Belt Drive; Taper Attach.

GRINDERS

No. 1 B. & S. Univ.; No. 3 Wilmarth & M. Surface.
 No. 48 Heald Internal; No. 14 Gardner Disc, B.-B.
 No. 1 Fraser Universal and Cutter.

AUTOMATIC SCREW MACHINES

28" Gridley Model "G" 4-spindle; 1 1/2" Cone 4-spindle.

MILLING MACHINES

No. 4 Cincinnati Plain; Power Rapid Travers; M. D.
 No. 1-5 Cincinnati; Rect. Overarm; P. R. T.; S. P. D.
 No. 2-B Brown & Sharpe Plain; Motor Drive.
 No. 2YB Brown & Sharpe Plain; Motor-in-Base.
 No. 2-A Brown & Sharpe Universal; Motor Drive.
 No. 2 Kempamith Univ.; B. D.; No. 18 Garvin Vert.
 Nos. 3, 2, 1 Cincinnati Pl.; C. D.; 4" P. & W. Spline.

TURRET LATHES

No. 2-A Warner & Swasey Hollow Hexagon Universal.
 Chucking equipment, Motor Drive.
 28" Libby; 7 1/2" and 4 1/2" hollow spindle; Motor Drive.
 24" Gisholt; 6 1/2" hollow spindle; Motor Drive.
 No. 5 Foster Gearing Head; 2 1/2" hollow spindle; S. P. D.
 2"x36" Jones & L.; Bar & Chucking Eqpt.; S. P. D.

RADIAL DRILLS & DRILL PRESSES

6-ft. Niles-Bement-Pond Right Line Full Universal; late type with Motor on Arm.
 3 1/2-ft. Cincinnati Bickford Plain; S. P. D. thru gr. box.
 22" Cincinnati-Bickford Sliding Head Upright.
 4-spindle Edlund Ball Bearing.
 4 and 1-spindle Avey.
 No. 1-S Garvin Duplex Horizontal.

SHAPER

24" Gould & Eberhardt High Duty; Motor Drive.

OPEN SIDE PLANER

84"x84"x18" D. & H.; 2 rail and side head (also aux. housing with 4th head); Aux. rolling table; M. D.

MISCELLANEOUS

HAMMER—300-lb. Bradley Upright Helve.
 PRESS—48-ton Lucas Forcing.
 PRESS—No. C-8 Ferracute Power.
 PRESS—No. 2 Niagara Power.

SUN MACHINERY COMPANY, INC.

36 VAN VECHTEN STREET,

NEWARK, N. J.

Don't Pass... BUY HERE

No. 00 Brown & Sharpe High Speed Automatic.
Nos. 0G, 0 & 2G Brown & Sharpe Automatics.
No. 4 W. & S. Universal Turret Lathe, G. F. H. (2).
No. 2 W. & S. Turret Lathe, G. F. H.—P. F. (3).
No. 2 B. & S. Hand Screw Machine, 90% new.
No. 0 B. & S. Hand Screw Machine.
3¹ Standard Reed Prentice Radial, Encl. Hd. G. B. M. D.
3¹ American Radial.
4¹ Cincinnati Bickford Radial G. B. D. Enclosed Head.
3¹/₂ Cinc. Bick. Radial, G. B. D.; 3¹ Morris Rad., G. B. D.
6¹ American triple geared Radial, G. B. D.
No. 13 B. & S. Univ. & Tool Grinder, c.s. dr., full equip.
32"x16¹/₂ Bridgeford, H. D. 6 speed, G. H. Lathe.
24"x12¹/₂ Boye & Emma, 3 step cone, D. B. G. Lathe.
30"x12¹/₂ Niles H. D. D. B. G. Lathe.
24¹/₂ Milwaukee B. G. Crank Shapers, cone, (2).
24¹/₂ Rockford, B. G. Crank Shaper, cone.
20¹/₂ American H. D.—B. G. Crank Shaper, cone.
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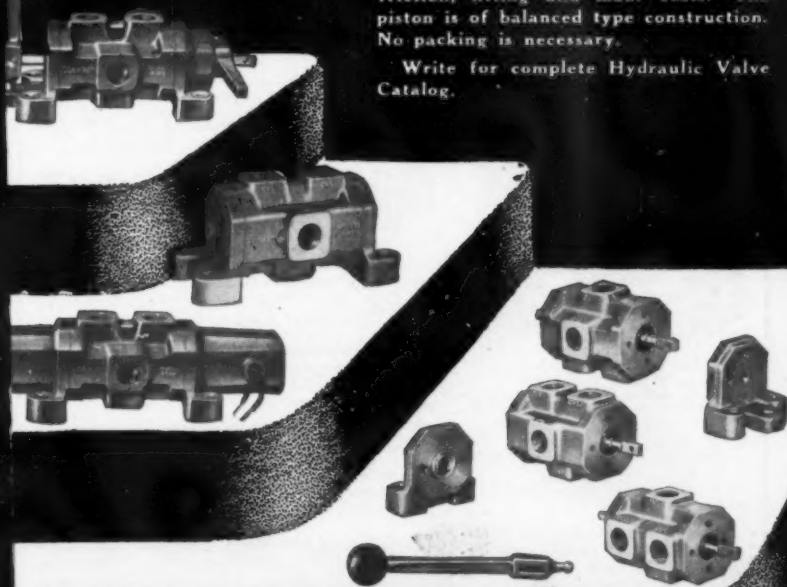
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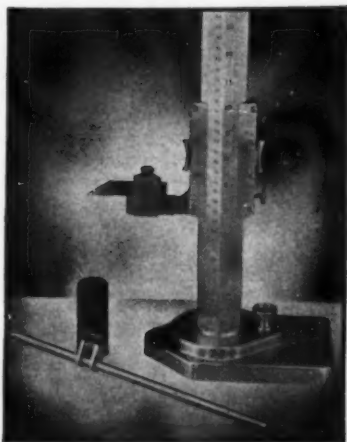
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$\frac{5}{32}$, $\frac{3}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{9}{32}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{7}{16}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{1}{2}$, 2-inch Diameter and 2-inch Shear.

Depth of throat 18-inches
Capacity according to size —
10 ga. to 18 ga. shear will cut
12 ga. and odd shaped holes.

ROTEX No. 10

(Not illustrated)

9 Punches and a Shear

$\frac{5}{32}$, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, 2-inch Diameter and 2-inch Shear.

Depth of throat 15-inches
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to 20 ga. shear will cut 14 ga. and
odd shaped holes.



ROTEX 18

(ROTEX 10 is also available)

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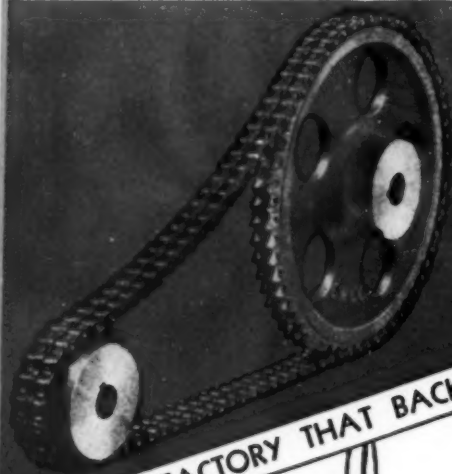
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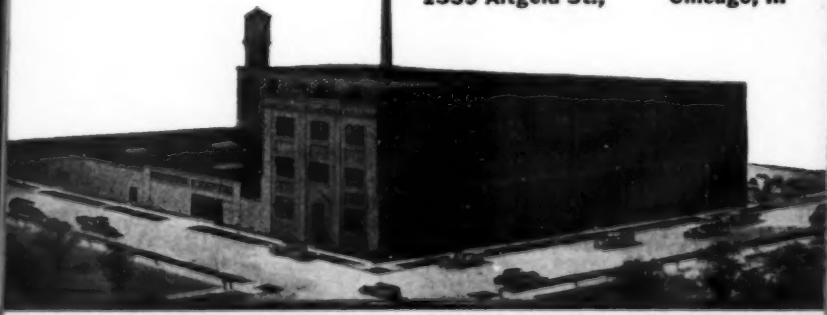
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